LUMBER and VENEER RECOVERY from DOUGLAS-FIR TREES in CALIFORNIA

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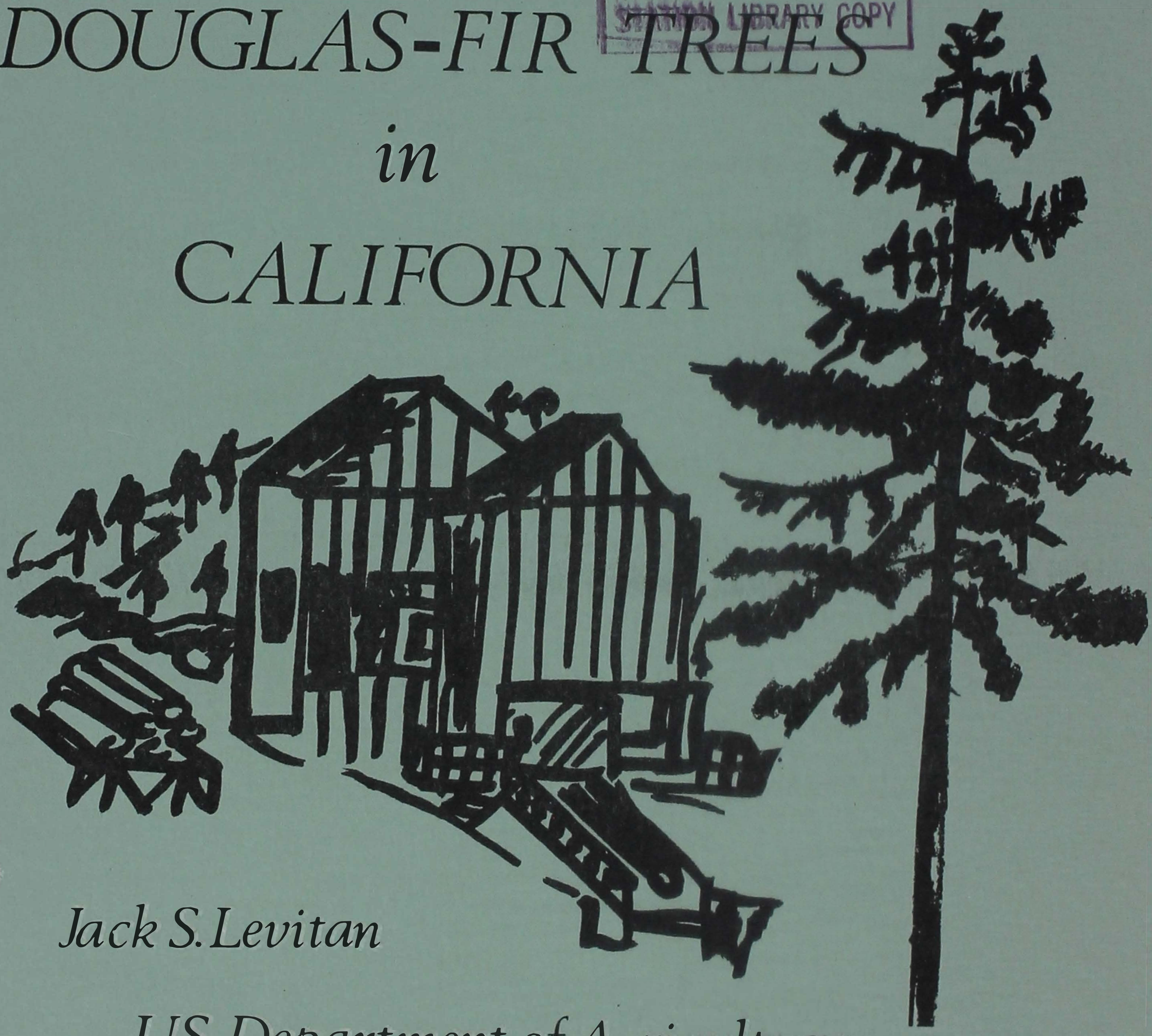

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FOREST SERVICE CALIFORNIA REGION
1969

TABLE OF CONTENTS

	PAGE
Introduction	i
Tree and Log Sampling	1
Lumber Recovery from Old-Growth Douglas-fir Trees	4
Lumber Recovery Study Procedures	4
Analysis of Lumber Recovery Data	5
Veneer Recovery From Old-Growth Douglas-fir Trees	12
Veneer Recovery Study Procedures	12
Analysis of Veneer Recovery Data	12
Lumber Recovery From Young Growth Douglas-fir Trees	20
Young-Growth Lumber Recovery Study Procedures	20
Analysis of Young-Growth Data	20
Appendix I	
Douglas-fir Peeler - Saw Log Grades	25
Additional Tables	28
Appendix II - Procedures Used to Construct Lumber and	
Veneer Grade Recovery Tables	48

LIST OF TABLES

TABLE	TITLE	PAGE
1	Number of Trees and Net Scale Volume by Origin and Manufacturing Point - Old-Growth Lumber Recovery Sample	2
2	Number of Trees and Net Scale Volume by Origin and Manufacturing Point - Old-Growth Veneer Recovery Sample	3
3	Number of Trees and Net Cruised Volume by Origin and Manufacturing Point - Young-Growth Lumber Recovery Sample	3
4	Lumber Grade Recovery in Percent of Total Shipping Tally - Values from Regression Analysis - Douglas-fir (Selects rough dry, Shop surfaced dry Dimension surfaced green)	7
5	Lumber Grade Recovery in Percent of Total Shipping Tally - Values from Regression Analysis - Douglas-fir (Selects & Shop surfaced dry, Dimension surfaced green)	8
6	Net Log Scale in Percent of Gross Log Scale and Over-run Percents for Each Lumber Tally Condition Analyzed	9
7	Estimated Shipping Tally Sales Realizations for Douglas-fir Lumber by Log Grade and Diameter Class - 1967 Prices	10
8	Summary of Lumber Yield by Log Grade for Each Shipping Tally Condition	11
9	Veneer Grade Recovery in Percent of Total Veneer Tally - Values From Regression Analysis - Douglas-fir	15
10	Net Log Scale in Percent of Gross Log Scale and Veneer Recovery Ratios Adjusted for Trim	16

TABLE	TITLE	PAGE
11	Calculation of Veneer Volume Lost in Trim	17
12	Estimated Douglas-fir Plywood Sales Realizations by Log Grade and Diameter Class - 1967 Prices	18
13	Summary of Veneer Yield by Log Grade - Dry Untrimmed Veneer	19
14	Lumber Grade Recovery in Percent of Total Shipping Tally - Young-Growth Trees - Values from Regression Analysis	22
15	Overrun Percent by DBH Class for Douglas-fir Young-Growth Trees - Values from Regression	23
16	Estimated Sales Realizations for Douglas-fir Lumber from Young-Growth Trees - 1967 Prices	24
	ADDITIONAL TABLES IN APPENDIX I	
17	Distribution of Sawmill Sample Logs by Diameter Class and Log Grade - Old-Growth Trees	28
18	Distribution of Sawmill Sample Logs by Length and Log Grade - Old-Growth Trees	29
19	Douglas-fir Lumber Recovery by 1 and 4-inch Diameter Classes in Board Feet and Percent (Mldg and Btr rough dry, Shop surfaced dry, Dimension surfaced green) - Raw Data - Old-Growth Trees	30
20	Douglas-fir Lumber Recovery by 1 and 4-inch Diameter Classes in Board Feet and Percent (Shop and Btr Surfaced dry, Dimension surfaced green) - Raw Data - Old-Growth Trees	35
21	1967 Douglas-fir Lumber Grade Selling Prices	40
22	Distribution of Veneer Sample Logs by Diameter Class and Log Grade	41
23	Recovery of Dry Untrimmed Veneer by 1 and 4-inch Diameter Classes in Square Feet (3/8 inch) and Percent - Raw Data - Old Growth Trees	42

TABLE	TITLE	PAGE
24	1967 Douglas-fir Veneer Grade Selling Prices	45
25	Number of Young-Growth Trees by Number of Logs and DBH Class	46
26	Lumber Grade Recovery From Young-Growth Douglas-fir Trees by DBH Class in Board Feet and Percent - Raw Data	47

ADDITIONAL TABLES IN APPENDIX II

27	Regression Equations for Each Lumber Grade by Log Grades (Mldg and Btr rough dry, Shop Surfaced dry, Dimension surfaced green)	51
28	Regression Equations for Each Lumber Grade by Log Grades (Shop and Btr surfaced dry, Dimension surfaced green)	53
29	Regression Equations for Each Veneer Grade by Log Grades	55
30	Regression Equations for Each Lumber Grade by DBH Class - Young-Growth Trees	56

INTRODUCTION

This report incorporates lumber and veneer grade recovery and related information from seven Northern California Douglas-fir Mill Studies. This recovery information is intended for use in appraising Douglas-fir timber on National Forest lands in California.

Data for this report is from the following sources:

LUMBER RECOVERY STUDIES

1. Wildwood Mill Study, 1960 (Old Growth)
   Ralph L. Smith Lumber Company

2. Yreka Mill Study, 1965 (Old-Growth)
   J. F. Sharp and Company

3. Anderson Mill Study, 1965 (Old and Young Growth)
   U. S. Plywood, Incorporated

4. Hoopa Mill Study, 1966 (Young Growth)
   Van Vleet Forest Products, Inc.

VENEER RECOVERY STUDIES (All Old Growth)

1. Weed Veneer Study, 1965
   International Paper Company

2. Anderson Veneer Study, 1965
   U. S. Plywood, Incorporated

3. Salyer Veneer Study, 1965
   Carolina-California Plywood, Incorporated

Wildwood study data is being used as the basis for appraising Douglas-fir timber in the California Region at this writing. The six later studies were made as part of a series of 10 studies each of veneer and lumber recovery by the Pacific Northwest Forest and

Range Experiment Station in Oregon, Washington, and California for the purpose of developing better log grading systems, to obtain up-to-date lumber and veneer recovery data, and to develop basic timber quality information for West Coast type Douglas-fir.

The source data for the individual studies has been combined to form three sets of recovery data: one for lumber recovery from old-growth trees, one for veneer recovery from old-growth trees, and one for young-growth lumber recovery to provide a basis for National Forest timber appraisal in the California Region.

Unpublished additional information regarding the individual mill studies is on file at the Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, or at the U. S. Forest Service Regional Office in San Francisco. Following is a partial list of the information on file:

1. Over-all work plan for developing log and tree grades for coast-type Douglas-fir sawtimber. Pacific Northwest Forest and Range Experiment Station, 1964.

2. Work plans for the individual mill studies identified as Yreka-Weed, 1965; Anderson, 1965; Salyer, 1966, and Hoopa, 1966. Pacific Northwest Forest and Range Experiment Station.

3. A report on the Wildwood, 1960, study has been published by the California Region of the Forest Service titled "Lumber Grade Recovery for Northern California Coast Range Old-Growth Douglas-fir" by H. F. Wise and R. E. Pywell, 1962. This is a report of basic information.

TREE AND LOG SAMPLING

Since the mill study information is to be applied to stands of trees, sampling was by whole trees. A minor exception to this occurred where small diameter top logs of trees designated for veneer production were included in the sawn sample.

The tree sample was stratified by diameter (DBH) and site classes to insure that the broadest possible range of conditions was represented. Trees were designated for sawing or peeling by a matching process so that the subsamples were as nearly alike as possible with regard to tree characteristics and origin. Trees designated for sawing were processed entirely into lumber. Trees designated for veneer were entirely peeled except for those logs too small to chuck on the lathe; these small logs were sawn. There were 250 trees sawn and 110 trees peeled for the old-growth portions of this analysis. The young growth sample consisted of 48 trees.

The tree sample does not represent an "average" condition or an "average" timber sale. Comparisons with this study data are valid only when the effects of log diameter, log grade, and other variables are considered.

Logs from sample trees were numbered by tree and log position in the woods. Diagrams of all visible grade defect indicators were made for each log in the mill yard. Woods length logs were bucked prior to sawing or peeling where necessary. Log grades based on diagramed grade defects were assigned to each sawlog for its sawn length. Log grades were the Peeler-Sawlog grades as presently applied in the California Region. Sawlogs were scaled after bucking to sawn length. Veneer trees were divided into 17 foot two block segments, starting at the butt of the tree. Single remaining blocks at the top of the tree when they occurred were combined with the next lower segment for scaling and recovery calculations. Scaling was by Forest Service check scalers in accordance with instructions in the National Forest Log Scaling Handbook, 1964 edition, and Region 5 Supplement thereto dated April 9, 1965.

Tables 1, 2, and 3 show the number of trees and the net volumes from each sampled National Forest and point of manufacture for each set of input data. Tables showing sample input by log grade, number of logs, and volume will be found in Appendix I.

TABLE 1. - NUMBER OF TREES AND NET SCALE VOLUME BY ORIGIN AND MANUFACTURING POINT

OLD-GROWTH LUMBER RECOVERY SAMPLE

Origin-National Forest	Manufacturing Point	Number of Whole Trees	Net Scale Volume-MBF
Klamath	Wildwood	17	66
	Yreka	95	205
Shasta-Trinity	Wildwood	25	51
	Anderson	47	133
Six Rivers	Wildwood	10	51
Mendocino	Anderson	22	26
Lassen	Anderson	12	34
Plumas	Anderson	22	54
	Total	250	620 1/

1/ Includes approximately 8 MBF of log scale volume of logs from veneer tree sample too small to chuck or otherwise not peelable.

TABLE 2. - NUMBER OF TREES AND NET SCALE VOLUME BY ORIGIN AND MANUFACTURING POINT

OLD-GROWTH VENEER RECOVERY SAMPLE

Origin-National Forest	Manufacturing Point	Number of Whole Trees	Net Scale Volume-MBF
Klamath	Weed	32	70
Shasta-Trinity	Anderson	19	49
	Salyer	7	10
Six Rivers	Salyer	31 1/	109 1/
Mendocino	Anderson	8	9
Lassen	Anderson	4	12
Plumas	Anderson	9	15
	Total	110	274

1/ Includes 3 trees totaling 2.6 MBF from Simpson Timber Company land near Korbel.

TABLE 3. - NUMBER OF TREES AND NET CRUISED VOLUME BY ORIGIN AND MANUFACTURING POINT

YOUNG-GROWTH LUMBER RECOVERY SAMPLE

Origin	Manufacturing Point	Number of Trees	Net Cruise Volume-MBF
Shasta-Trinity N.F.	Anderson	14	10
Six Rivers N.F.	Hoopa	17	9
Private Land (Korbel) Simpson Timber Co.	Hoopa	17	8
	Total	48	27

LUMBER RECOVERY FROM OLD-GROWTH DOUGLAS-FIR TREES

LUMBER RECOVERY STUDY PROCEDURES

Sawing.--Sawing generally followed normal practices; however, cooperating mills were instructed to recover optimum value from each log through manufacture of their usual lumber items. This generally meant that all Shop and Select items were removed before the logs were canted for Dimension production.

Lumber as sawn was identified by log by a color code at the head saw followed by a sawing order number applied to each board. A list of sawing order numbers and corresponding tree and log numbers was made on the mill deck immediately prior to sawing. Pieces were renumbered at each stage of manufacture where numbers would otherwise be lost.

Lumber drying and surfacing.--The results of this combined study reflect the following two conditions of final primary manufacture:

1.	Moulding and Better	-	Rough Dry
	Shop	-	Surfaced Dry
	Dimension	-	Surfaced Green
2.	Shop and Better	-	Surfaced Dry
	Dimension	-	Surfaced Green

Shop and Better lumber was kiln dried. A separate analysis of the recovery data was made for each of the above two conditions.

Lumber tally.--Lumber was tallied at various stages of manufacture depending on the individual mill concerned. Where a complete tally at the final stage of primary manufacture was not feasible, sample tallies were made to generate conversion factors to be applied to the full lumber

tally at a previous stage of manufacture. These conversions were made by the Pacific Northwest Forest and Range Experiment Station in their summarization of the lumber tally data.

Lumber was graded by WWPA and WCLIB check graders. Lumber tally volumes were calculated on the basis of the nominal dimensions of the lumber produced in final primary manufacturing.

ANALYSIS OF LUMBER RECOVERY DATA

In order to meet the requirements for timber appraisal, the lumber recovery study data has been analyzed to provide estimates of lumber grade distributions by the log grades and diameter classes currently in use in the California Region, together with estimates of the ratio of total lumber tally to log scale by diameter classes (overrun).

For timber appraisal use, lumber recovery data is based on the final product of primary manufacture (shipping tally). According to present mill practice in the California Region, lumber is generally shipped in the following conditions by grade groups: Moulding and Better-rough dry, Shop-surfaced dry, Dimension-surfaced green. Data reflecting this present mixture of shipping tally lumber conditions were analyzed for immediate use. Data reflecting a product mixture consisting of Shop and Better surfaced dry with surfaced green Dimension lumber were also analyzed for possible future use in appraisal.

Lumber grade recovery.--The lumber tallies by lumber grades for each log were converted to percentages. These percentages were then used to produce tables of curved lumber grade distributions by 4-inch diameter classes for each log grade (Tables 4 and 5). These curved distributions were derived by the application of stepwise multiple regression analysis to the raw percentage distributions for each log grade using log diameter and various transformations of diameter as the independent variables. The selected equations generated by this procedure were then solved for the appropriate diameter class midpoints to produce the tables. A more complete explanation of these procedures appears in Appendix II.

Curved values were not produced for 1 and 2 Peeler logs; there were too few logs in these grades to provide mathematically valid regressions.

Six cull logs with a gross scale of 8210 board feet were sawn. These were not included in grade recovery analysis.

Overrun factor.--Lumber overrun factors were calculated for each 4-inch diameter class by dividing total lumber tally board feet by total net scale in board feet for each class. (Table 6). These ratios were not curved; average net log scale in percent of gross scale is also shown in this table. Overrun is equal to the overrun factor minus 1, expressed as a percentage.

Predicted sales realizations.--Estimated sales realizations for each log grade except 1&2 Peeler, were calculated for lumber by applying 1967 Regional Average lumber grade selling prices to the lumber grade distribution for the end product mix presently representative in the Region (rough dry Moulding and Better, etc.) These values appear in Table 7.

The values for Grade 1&2 Peeler logs in Table 7 were determined by increasing the 3 Peeler values by 15 percent for each diameter class. This percentage corresponds to the average value difference between all 1&2 and 3 Peelers included in the 1960 Wildwood Mill Study based on whole tree data. Wildwood study data was used for this determination, because this study sample was the only one having a substantial number of 1 and 2 Peelers: 26 logs compared to 32 total for the combined studies sample.

Testing results.--In order to test the applicability of the lumber recovery and overrun factors developed by this analysis, comparisons were made with lumber recoveries and log scale data for ten different batch tests made between 1964 and 1968. The amount of lumber in each test varied from 83,000 to 148,000 board feet. Predicted log scale values averaged about 5 percent higher than actual realized batch test values in terms of dollars per thousand board feet, Scribner scale. Overrun predictions averaged about 5 percentage points low. It appears that predictions based on this analysis are relatively close in the more recent batch tests, and tend to underestimate overrun and overestimate log selling price values in the older batch tests. It is expected that predictions would be close in higher valued timber stands and would tend to overestimate low valued stands if used without adjustment.

TABLE 4. - LUMBER GRADE RECOVERY IN PERCENT OF TOTAL SHIPPING TALLY

VALUES FROM REGRESSION ANALYSIS

DOUGLAS-FIR

4-Inch Diameter Class	Selects (rough dry)				Shop (surfaced dry)				Dimension (surfaced green)					Total Percent
	B&Btr	C	D	Mldg	3 Clr	1	2	3	Sel Str	Const	Std	Util	Econ	
LOG GRADE 3 PEELER														
22 - 25	1.0	6.7	10.8	13.5	0.3	1.5	4.8	1.3	12.2	21.0	10.5	11.9	4.5	100.0
26 - 29	2.1	7.8	10.1	18.2	0.4	1.6	5.1	1.8	9.4	17.8	9.3	11.7	4.7	100.0
30 - 33	3.3	8.8	9.5	23.1	0.5	1.7	5.4	2.3	6.4	14.7	7.9	11.5	4.9	100.0
34 - 37	4.3	9.6	8.9	26.9	0.6	1.8	5.6	2.6	4.1	12.3	6.9	11.4	5.0	100.0
38 - 41	5.0	10.3	8.5	29.9	0.6	1.9	5.8	2.9	2.2	10.4	6.1	11.3	5.1	100.0
42 - 45	5.6	10.8	8.2	32.3	0.7	1.9	6.0	3.2	0.7	8.8	5.4	11.2	5.2	100.0
46 - 49	6.1	11.2	7.8	34.1	0.7	2.0	6.1	3.4	0.0	7.5	4.8	11.0	5.3	100.0
50 - 53	6.5	11.5	7.5	35.4	0.8	2.0	6.1	3.5	0.0	6.3	4.3	10.9	5.2	100.0
LOG GRADE 2 SAWLOG														
10 - 13	0.1	0.2	0.3	0.9	0.0	0.3	0.0	0.2	7.9	48.7	22.9	15.2	3.3	100.0
14 - 17	0.0	0.5	1.4	1.4	0.0	0.0	0.8	1.1	10.2	41.1	22.8	17.0	3.7	100.0
18 - 21	0.1	1.1	2.4	2.8	0.2	0.7	3.7	2.0	10.4	33.5	21.3	17.7	4.1	100.0
22 - 25	0.4	1.8	3.2	4.8	0.5	2.6	7.2	2.6	8.8	27.8	18.7	17.2	4.4	100.0
26 - 29	0.8	2.5	3.8	7.0	1.0	4.8	10.6	3.1	6.4	23.3	15.7	16.2	4.8	100.0
30 - 33	1.2	3.1	4.4	9.4	1.4	6.9	13.5	3.4	3.8	19.7	12.8	15.1	5.3	100.0
34 - 37	1.7	3.6	4.8	11.7	1.7	8.7	15.3	3.6	1.6	16.6	10.4	14.3	6.0	100.0
38 - 41	2.1	4.1	5.4	13.8	1.9	9.6	15.7	3.7	0.2	13.6	8.8	14.3	6.8	100.0
42 - 45	2.5	4.4	5.8	15.6	1.9	9.7	14.3	3.8	0.1	10.6	8.2	15.3	7.8	100.0
46 - 49	2.8	4.3	6.2	17.3	1.7	8.4	10.9	3.8	1.5	7.3	9.1	17.6	9.1	100.0
50 - 53	2.9	4.1	6.7	18.4	1.2	5.6	5.1	3.8	4.9	3.5	11.6	21.5	10.7	100.0
LOG GRADE 3 SAWLOG														
10 - 13	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.5	2.7	35.5	29.2	25.4	6.2	100.0
14 - 17	0.0	0.4	0.1	0.1	0.0	0.0	1.1	1.7	1.9	23.0	30.5	33.0	8.2	100.0
18 - 21	0.0	0.4	0.2	0.7	0.1	0.6	3.6	2.8	1.4	15.4	29.0	36.1	9.7	100.0
22 - 25	0.1	0.4	0.4	1.4	0.3	1.6	6.8	3.8	1.0	10.8	26.0	36.4	11.0	100.0
26 - 29	0.1	0.4	0.7	2.4	0.5	2.8	10.5	4.8	0.7	8.4	21.9	34.8	12.0	100.0
30 - 33	0.2	0.4	1.1	3.4	0.8	4.2	14.5	5.8	0.5	7.4	16.9	31.8	13.0	100.0
34 - 37	0.2	0.4	1.5	4.6	1.1	5.8	18.8	6.7	0.3	7.7	11.4	27.7	13.8	100.0
38 - 41	0.3	0.4	1.9	5.9	1.4	7.4	23.3	7.7	0.1	8.9	5.4	22.8	14.5	100.0
42 - 45	0.4	0.3	2.3	7.1	1.8	9.0	27.8	8.5	0.0	10.7	0.0	17.1	15.0	100.0
46 - 49	0.4	0.3	2.5	7.9	2.0	10.1	30.6	8.8	0.0	12.3	0.0	10.4	14.7	100.0

TABLE 5. - LUMBER GRADE RECOVERY IN PERCENT OF TOTAL SHIPPING TALLY

VALUES FROM REGRESSION ANALYSIS

DOUGLAS-FIR

4-Inch Diameter Class	Selects (surfaced dry)				Shop (surfaced dry)				Dimension (surfaced green)					Total Percent
	B&Btr	C	D	Mldg	3 Clr	1	2	3	Sel Str	Const	Std	Util	Econ	
LOG GRADE 3 PEELER														
22 - 25	1.6	6.5	10.6	11.3	0.4	2.2	4.7	1.4	11.4	21.8	12.1	10.0	6.0	100.0
26 - 29	2.3	8.6	10.1	15.1	0.5	2.2	5.1	2.0	8.8	18.4	10.6	10.1	6.2	100.0
30 - 33	3.1	10.8	9.6	19.0	0.6	2.2	5.6	2.5	6.0	14.9	9.0	10.3	6.4	100.0
34 - 37	3.7	12.6	9.1	22.1	0.7	2.2	5.9	3.0	3.9	12.1	7.8	10.4	6.5	100.0
38 - 41	4.1	13.9	8.8	24.6	0.7	2.2	6.2	3.3	2.3	9.9	6.8	10.6	6.6	100.0
42 - 45	4.5	15.0	8.5	26.6	0.8	2.2	6.5	3.6	0.9	8.1	6.0	10.6	6.7	100.0
46 - 49	4.8	16.0	8.3	28.1	0.8	2.2	6.6	3.8	0.0	6.6	5.4	10.6	6.8	100.0
50 - 53	5.1	16.5	8.0	29.2	0.8	2.2	6.7	4.0	0.0	5.2	4.8	10.7	6.8	100.0
LOG GRADE 2 SAWLOG														
10 - 13	0.2	0.0	0.3	0.5	0.0	0.0	0.0	0.2	8.6	47.1	24.1	15.3	3.7	100.0
14 - 17	0.1	0.6	1.2	1.3	0.0	0.1	1.6	1.1	9.1	41.1	23.6	16.4	3.8	100.0
18 - 21	0.2	1.4	2.1	2.6	0.3	1.6	5.2	1.9	8.7	33.5	21.5	16.7	4.3	100.0
22 - 25	0.5	2.1	2.9	4.0	0.6	3.2	7.9	2.4	7.7	27.7	19.4	16.5	5.1	100.0
26 - 29	0.9	2.8	3.5	5.7	1.0	5.0	10.0	2.8	6.4	22.6	17.1	16.1	6.1	100.0
30 - 33	1.3	3.5	3.9	7.4	1.4	6.9	11.6	3.0	4.8	18.7	14.8	15.4	7.3	100.0
34 - 37	1.8	4.1	4.4	9.2	1.9	8.9	12.9	3.2	3.0	15.2	12.3	14.6	8.5	100.0
38 - 41	2.4	4.7	4.7	11.1	2.4	10.9	13.9	3.3	1.0	12.2	9.9	13.6	9.9	100.0
42 - 45	3.0	5.2	5.0	12.9	2.8	12.9	14.7	3.3	0.0	9.4	7.2	12.4	11.2	100.0
46 - 49	3.6	5.7	5.1	14.5	3.2	14.6	15.0	3.2	0.0	7.0	4.7	11.0	12.4	100.0
50 - 53	4.1	6.1	5.2	16.1	3.7	16.4	15.2	3.0	0.0	4.8	2.1	9.6	13.7	100.0
LOG GRADE 3 SAWLOG														
10 - 13	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.6	2.5	34.2	29.2	25.9	7.2	100.0
14 - 17	0.0	0.3	0.2	0.1	0.0	0.0	1.4	1.8	1.7	21.1	29.8	33.5	10.1	100.0
18 - 21	0.0	0.4	0.3	0.3	0.1	0.4	3.9	2.7	1.1	13.3	28.2	36.6	12.7	100.0
22 - 25	0.1	0.4	0.5	0.8	0.3	1.8	7.1	3.6	0.7	8.7	25.0	36.0	15.0	100.0
26 - 29	0.1	0.5	0.8	1.4	0.6	3.5	10.7	4.3	0.5	6.3	20.7	33.6	17.0	100.0
30 - 33	0.1	0.6	1.1	2.2	1.0	5.6	14.7	5.0	0.3	5.5	15.6	29.4	18.9	100.0
34 - 37	0.2	0.6	1.4	3.0	1.4	7.8	18.9	5.7	0.1	5.8	10.0	24.3	20.8	100.0
38 - 41	0.2	0.7	1.7	3.9	1.9	10.2	23.2	6.3	0.0	7.3	4.0	18.1	22.5	100.0
42 - 45	0.3	0.8	2.1	4.8	2.2	12.4	27.1	6.7	0.0	9.2	0.0	10.9	23.5	100.0
46 - 49	0.4	0.7	2.2	5.3	2.5	14.0	29.7	6.9	0.0	11.3	0.0	3.4	23.6	100.0

TABLE 6. - NET LOG SCALE IN PERCENT OF GROSS LOG SCALE AND OVERRUN PERCENTS FOR EACH LUMBER TALLY CONDITION ANALYZED

Diameter Class (Inches)	Net Scale Volume Percent of Gross Log Scale	Overrun Percent Mldg & Btr Shop Dimension	R/D S/D S/G	Overrun Percent Shop & Btr Dimension	S/D S/G
10 - 13	96.8	45.0		44.5	
14 - 17	96.6	40.2		39.9	
18 - 21	94.6	29.9		29.1	
22 - 25	95.0	22.4		21.5	
26 - 29	91.4	16.2		14.9	
30 - 33	91.4	12.0		10.7	
34 - 37	89.1	16.7		15.1	
38 - 41	88.5	8.7		7.0	
42 - 45	82.9	7.6		6.7	
46 - 49	88.9	6.7 1/		4.9 1/	
50 - 53	67.5	6.7 1/		4.9 1/	
54 - 57	57.3	6.7 1/		4.9 1/	

1/ These overruns are based on the combined volumes for logs 46-57 inches.

TABLE 7. - ESTIMATED SHIPPING TALLY SALES REALIZATIONS FOR DOUGLAS-FIR LUMBER BY LOG GRADE AND DIAMETER CLASS

1967 PRICES

Mldg & Btr R/D; Shop S/D; Dimension S/G

Diam. Class (Inches)	Value by Log Grade - Dollars/M			
	1 & 2 Peeler [1/]	3 Peeler	2 Sawlog	3 Sawlog
10 - 13			72.95	68.03
14 - 17			72.93	64.60
18 - 21			74.07	63.08
22 - 25		90.48	76.28	62.69
26 - 29		93.76	78.80	63.14
30 - 33	111.79	97.21	81.38	64.14
34 - 37	114.90	99.91	83.61	65.65
38 - 41	117.33	102.03	85.44	67.49
42 - 45	119.27	103.71	86.40	69.63
46 - 49	120.69	104.95	86.31	72.19
50 - 53	121.87	105.97	84.96	

1/ Values for 1 & 2 Peeler logs determined by multiplying 3 Peeler values by 1.15 for each diameter class.

TABLE 8. - SUMMARY OF LUMBER YIELD BY LOG GRADE FOR EACH SHIPPING TALLY CONDITION

Log Grade	No. Logs	Log Scale Gross	Log Scale Net	Defect %	Shipping Tally 1/	Over-run % 1/	Shipping Tally 2/	Over-run % 2/
		Board Feet			B.F.		B.F.	
1 & 2 Peeler	32	42,390	35,450	16.4	36,330	2.5	35,450	0.0
3 Peeler	134	103,960	90,650	12.8	102,715	13.3	100,623	11.1
2 Sawlog	913	399,720	374,000	6.4	438,218	17.2	434,530	16.2
3 Sawlog	529	131,150	119,410	9.0	151,001	26.5	150,698	26.2
Total	1,608	677,220	619,510	8.5	728,264	17.6	721,301	16.4

1/ Moulding and Better, rough dry; Shop, surfaced dry; Dimension, surfaced green.

2/ Shop and Better, surfaced dry; Dimension, surfaced green.

VENEER RECOVERY FROM OLD-GROWTH DOUGLAS-FIR

VENEER RECOVERY STUDY PROCEDURES

Peeling and clipping.--Logs were peeled in line with normal procedures for plants producing a variety of panel types. Blocks were peeled to a 6 to 8-inch core depending on the mill. Most of the veneer produced was 1/10-inch with small quantities of 1/8 and 1/5-inch also peeled.

Veneer was identified by block by means of color codes applied by a 6-orifice dye spraying unit located behind the lathe.

Veneer was clipped for optimum grade yields.

Veneer drying.--Veneer was dried under normal drying schedules for heart and sap veneer.

Veneer grading and tally.--Veneer was graded under the supervision of an APA or TECO grade supervisor. Grading followed U. S. Commercial Standard CS 45-60.

Veneer was tallied by grade after drying. Full and half sheets were tallied as they came from the dryer; random widths and reclip veneer were tallied later. Veneer tally was converted to square-feet 3/8-inch basis based on the dimensions of dry untrimmed sheets. Veneer tally volumes were reduced for trim by the application of conversion factors developed from mill data by the Pacific Northwest Region of the Forest Service in cooperation with the Pacific Northwest Forest and Range Experiment Station. The application of these factors is discussed under the ANALYSIS OF VENEER RECOVERY DATA portion of this report.

ANALYSIS OF VENEER RECOVERY DATA

The collection and analysis of mill study veneer recovery data for appraisal use ends with the production of dry veneer adjusted for trim in manufacture. The value relationship with the final product (plywood) is established by an analysis of panel production and selling value data from APA annual reports.

Analysis of veneer recovery data followed the same general procedures used for the lumber recovery analysis. Estimated veneer grade distributions by log grade and diameter class were calculated along with ratios of total veneer tally to net log scale by diameter classes. Trim adjustments were then applied to the recovery ratios.

Veneer grade recovery. --Veneer tallies by veneer grade for each log were converted to percentages. These percentages were then used to produce tables of curved veneer grade distributions by 4-inch diameter classes for each log grade (Table 9). This was done by using the stepwise regression procedure described under the ANALYSIS OF LUMBER RECOVERY DATA section of this report and further described in APPENDIX II.

Curved values were not produced for 1 and 2 Peeler logs. There were too few logs in these grades to provide mathematically valid regressions.

Recovery ratios. --Veneer recovery ratios were calculated for each 4-inch log diameter class by dividing total veneer tally square feet (3/8-inch basis) by total net scale in board feet for each class (Table 10). Recovery ratios shown were not curved; average net log scale percent of gross log scale is also shown in this table.

Trim loss. --Trim loss factors, derived from a study conducted in the Pacific Northwest Region, were applied to the veneer item and grade distribution from this analysis to produce an over-all trim factor. This factor was applied as a reduction to the veneer recovery ratio for each diameter class. Table 11 shows the calculation of the over-all trim factor used in this analysis. It was found that the average trim factor as calculated here does not vary from the over-all factor by more than approximately 1 percentage point by log grade.

Predicted sales realizations. --Estimated sales realizations calculated for veneer were based on 1967 Douglas-fir plywood prices as calculated by the Pacific Northwest Region from APA plywood sales data. These values appear in Table 12.

The values for Grade 1&2 peeler logs in Table 12 were determined by increasing the 3 Peeler values by 10 percent for each

diameter class. This percentage corresponds to the average value difference between all 1 & 2 and 3 Peelers included in the combined study sample.

Testing results.--No veneer batch tests have been made in this Region at this writing. There is no batch test data available to test recovery volume and value predictions.

TABLE 9. - VENEER GRADE RECOVERY IN PERCENT OF TOTAL VENEER TALLY VALUES FROM REGRESSION ANALYSIS DOUGLAS-FIR

4-Inch Diameter Class	Veneer Grade A	B	C	D	Total Percent
LOG GRADE 3 PEELER					
22 - 25	14.4	17.4	56.1	12.1	100.0
26 - 29	15.7	19.6	51.1	13.6	100.0
30 - 33	17.2	22.3	45.2	15.3	100.0
34 - 37	18.5	24.6	40.1	16.8	100.0
38 - 41	19.7	26.7	35.4	18.2	100.0
42 - 45	20.8	28.5	31.3	19.4	100.0
46 - 49	21.7	30.2	27.5	20.6	100.0
50 - 53	22.6	31.8	24.0	21.6	100.0
LOG GRADE 2 SAWLOG					
10 - 13	0.3	0.5	51.7	47.5	100.0
14 - 17	1.0	3.2	44.6	51.2	100.0
18 - 21	2.2	6.6	36.4	54.8	100.0
22 - 25	3.5	9.7	30.0	56.8	100.0
26 - 29	4.8	12.5	25.4	57.3	100.0
30 - 33	6.4	15.0	22.4	56.2	100.0
34 - 37	8.0	17.2	21.2	53.6	100.0
38 - 41	9.7	19.1	21.7	49.5	100.0
42 - 45	11.6	20.8	23.9	43.7	100.0
46 - 49	13.6	22.2	27.7	36.5	100.0
LOG GRADE 3 SAWLOG					
10 - 13	0.5	0.2	21.3	78.0	100.0
14 - 17	1.1	1.0	11.4	86.5	100.0
18 - 21	0.9	0.7	8.9	89.5	100.0
22 - 25	0.6	0.7	9.6	89.1	100.0
26 - 29	0.5	1.8	11.4	86.3	100.0
30 - 33	0.8	4.4	13.0	81.8	100.0
34 - 37	0.8	8.7	13.8	75.9	100.0

TABLE 10. - NET LOG SCALE IN PERCENT OF GROSS LOG SCALE AND VENEER RECOVERY RATIOS ADJUSTED FOR TRIM

Diameter Class (Inches)	Net Log Scale in Percent of Gross Log Scale	Recovery Ratio
10 - 13	96.5	2.187
14 - 17	98.9	2.042
18 - 21	95.8	2.160
22 - 25	95.6	2.217
26 - 29	90.5	2.208
30 - 33	90.7	2.175
34 - 37	91.0	2.499
38 - 41	87.8	2.241
42 - 45	86.9	2.111
46 - 49	90.7	2.327
50 - 53	92.4	3.005 1/

1/ This ratio is based on only 2 logs.

TABLE 11. - CALCULATION OF VENEER VOLUME LOST IN TRIM

	Volume Sq. Ft.	Jointing Loss Factor	Volume	Return to Reclip	Through Edge Gluer	Volume	Reclip Factor and Volume	Jointing Loss Factor	Volume	Glue Spread Factor	Volume	Trim Factor	Final Volume
Random Width 102" Grades A-C	83,521	0.923	77,090	0.140	0.860	10,793 66,297	0.756 8160	0.923	7,532			0.877 0.877	6,606 58,142
Half Sheets Grade A	6,155												Assumed Entirely Used as Patch
Half Sheets Grades Ap-D	213,164											0.877	186,945
Random Width 50" All Grades and Random Width 102" Grade D	111,326						0.902		100,416			0.877	88,065
Full Sheets	313,215											0.877	274,690
Total	727,381												614,448

$$\text{Trim Factor} = \frac{614,448}{727,381} = 0.8447$$

TABLE 12. - ESTIMATED DOUGLAS-FIR PLYWOOD SALES REALIZATIONS BY LOG GRADE AND DIAMETER CLASS - 1967 PRICES

Diam. Class (Inches)	Value by Log Grades - Dollars/M Sq. Ft.			
	1 & 2 Peeler[1/]	3 Peeler	2 Sawlog	3 Sawlog
10 - 13			44.81	43.06
14 - 17			46.66	43.53
18 - 21			49.34	43.02
22 - 25		68.62	52.05	42.77
26 - 29		70.88	54.68	43.42
30 - 33	80.94	73.58	57.52	45.34
34 - 37	83.48	75.89	60.29	48.68
38 - 41	85.81	78.01	63.08	
42 - 45	87.88	79.89	66.04	
46 - 49	89.69	81.54	69.02	
50 - 53	91.45	83.14		

1/ Values for 1 and 2 Peeler logs determined by multiplying 3 Peeler values by 1.10 for each diameter class.

TABLE 13. - SUMMARY OF VENEER YIELD BY LOG GRADE-DRY UNTRIMMED VENEER

Log Grade	Number of Logs	Log Scale Gross	Log Scale Net	Defect %	Veneer Tally 1/	Recovery Ratio 1/
		Board Feet			Square Feet-3/8"	
1 & 2 Peeler	8	9,840	9,050	8.0	28,876	3.191
3 Peeler	75	60,750	55,010	9.4	157,042	2.855
2 Sawlog	404	186,200	171,960	7.6	454,860	2.645
3 Sawlog	111	40,200	38,230	4.9	81,890	2.142
Total	598	296,990	274,250	7.7	722,668 2/	2.635

1/ Recovery ratios not adjusted for trim. Trim adjustment results in an approximate 15 percent volume loss; see Table 11.

2/ Total does not include 4,713 square feet peeled from six cull logs included in Table 11.

LUMBER RECOVERY FROM YOUNG-GROWTH DOUGLAS-FIR TREES

STUDY PROCEDURES

Procedures used were generally the same as those for the old-growth lumber recovery portion of this report. The young-growth sample consisted of 48 whole trees with a DBH range of 12 to 34 inches, and a net cruised volume of 26,850 board feet. Final lumber tallies reflect a surfaced green condition for 8/4 and 4-inch Dimension items and either surfaced dry or rough green for Shop and Better grades depending on the mill. A small volume of 3-inch items was tallied rough green, while the few 4/4 commons produced were given an anticipated surfaced green grade.

Dimension items accounted for approximately 98 percent of the lumber produced.

ANALYSIS OF YOUNG-GROWTH DATA

Analysis of the data followed the same general procedures as for the old-growth timber; results, however, represent recoveries by tree DBH classes rather than log diameter classes (Table 14). Log grades were not used in this analysis although the trees were log graded. It was noted that 85 percent of net scaled volume was in grade 2 Sawlog with the rest graded 3 Sawlog according to present Regional log grade specifications.

Overruns were calculated using net cruised volume by DBH class rather than net scaled volumes. The total cruised volume estimate based on the current Regional second growth volume tables was approximately 10 percent less than the actual scaled volume of the sample. Defect based on log scale amounted to approximately 3 percent. Average overruns were found to exhibit considerable variation between DBH classes. For this reason, a multiple regression procedure was used to provide a smooth progression of overrun values for use in young growth timber appraisals, Table 15. The average calculated overrun for the entire sample was 31.7 percent based on cruised volume, or 18.4 percent based on the net scaled volume.

Estimated shipping tally realizations based on tree DBH classes are shown in Table 16. Additional tables regarding the young growth sample and raw data lumber recoveries appear in Appendix I.

No batch test data is yet available to check young growth volume and value predictions.

TABLE 14. - LUMBER GRADE RECOVERY IN PERCENT OF TOTAL LUMBER TALLY
YOUNG-GROWTH TREES - VALUES FROM REGRESSION ANALYSIS

DBH	B & Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	Sel Str	Const	Std	Util	Econ	Total Percent
12	0.3	0.2	0.2	0.2	0.0	0.0	0.0	0.0	16.7	55.9	19.3	4.5	2.7	100.0
14	0.3	0.2	0.2	0.2	0.0	0.0	0.0	0.0	16.4	55.3	19.5	5.1	2.8	100.0
16	0.3	0.2	0.2	0.3	0.0	0.0	0.0	0.0	16.0	54.4	19.8	5.8	3.0	100.0
18	0.3	0.2	0.2	0.3	0.0	0.0	0.1	0.1	15.5	53.4	20.1	6.8	3.1	100.0
20	0.3	0.2	0.2	0.3	0.0	0.0	0.2	0.1	14.9	52.0	20.5	8.0	3.3	100.0
22	0.2	0.2	0.2	0.4	0.0	0.0	0.4	0.1	14.1	50.3	21.0	9.5	3.6	100.0
24	0.2	0.2	0.2	0.4	0.0	0.0	0.6	0.2	13.2	48.3	21.6	11.2	3.9	100.0
26	0.1	0.2	0.2	0.5	0.0	0.0	0.8	0.3	12.1	46.0	22.3	13.3	4.2	100.0
28	0.1	0.2	0.2	0.6	0.1	0.0	1.0	0.4	10.8	43.1	23.1	15.7	4.7	100.0
30	0.1	0.2	0.2	0.7	0.1	0.0	1.3	0.5	9.3	40.0	24.0	18.5	5.1	100.0
32	0.0	0.2	0.2	0.8	0.1	0.0	1.6	0.6	7.6	36.4	25.1	21.8	5.7	100.0
34	0.0	0.2	0.2	1.0	0.2	0.0	2.0	0.7	5.7	32.2	26.2	25.3	6.3	100.0

TABLE 15. - OVERRUN PERCENT BY DBH CLASS FOR DOUGLAS-FIR YOUNG-GROWTH TREES - VALUES FROM REGRESSION 1/

DBH Class (Inches)	Overrun Percent 1/
12	-5.7
14	6.2
16	16.8
18	26.1
20	33.8
22	39.7
24	43.8
26	45.7
28	45.4
30	42.7
32	37.3
34	29.1

1/ $Y = 0.0714 + 0.07784X - 0.0000363X^3$.
F = 3.74 - significant at 5% level of probability.
Overrun percent = (Y - 1) (100); DBH = X.

TABLE 16. - ESTIMATED SALES REALIZATIONS FOR DOUGLAS-FIR LUMBER FROM YOUNG-GROWTH TREES - 1967 PRICES

DBH Class (Inches)	Value - Dollars/M Lumber Tally
12	75.87
14	75.66
16	75.42
18	75.09
20	74.63
22	74.05
24	73.39
26	72.62
28	71.76
30	70.79
32	69.57
34	68.36

APPENDIX I

DOUGLAS-FIR PEELER-SAW

LOG GRADES

ADDITIONAL TABLES

DOUGLAS-FIR PEELER-SAW LOG GRADES

DOUGLAS-FIR LOG GRADE DEFINITIONS AND GENERAL CONSIDERATIONS

1. Grade all logs on a 16-foot basis.

2. A "knot" is a branch or branch stub, including visible stubs broken off below bark surface.

3. A knot-indicator is a visible bark pattern which indicates the presence of an overgrown knot. The distorted bark pattern is usually larger than the knot which it indicates. Generally it is two or more times the size of the knot. Knot indicators are measured from edge to edge across the distorted bark pattern in a vertical direction.

4. Size limits of knots refers to limb size inside limb bark, and just outside the limb collar. Knot sizes are by 1/2" size classes, and the number refers to the maximum upper limit of the class, e.g. 1-1/2" class = over 1" but not over 1-1/2".

5. The 3-peeler grade may have combinations of knots in the 1-1/2" class and under. In determining if the log meets the surface characteristic requirement, consider one knot in the 1-1/2" class equal to two and one-half knots under the 1-1/2" class.

6. Knot clusters and burls. See Log Scaling Handbook, Page 47-8. Non-deductible knot clusters develop from adventitious buds. These cause loss of quality in the product produced. Deductible knot clusters consist of a group of larger limbs that penetrate deeply into the log. These knot clusters usually cause loss of volume in the product produced, rather than loss of quality. They are deductible in scaling and have no effect on log grade.

7. Minimum merchantability requirements for logs: Minimum length, 10 feet; minimum d.i.b., 10"; net scale, 33-1/3% or more of gross scale.

DOUGLAS-FIR PEELER-SAW LOG GRADES - 16 FOOT LOGS

Log Grade	Number 1 Peeler	Number 2 Peeler	Number 3 Peeler
Minimum d.i.b.	30"	30"	24"
	Not Permitted on Log		
Defects indicating rot, i.e., conks or swollen knots.	Permitted on adjacent log if 12 ft. or more from log graded.	Permitted on adjacent log if 8 ft. or more from log graded.	Permitted on adjacent log.
Surface Characteristics	100% clear. No knots or knot indicators.	75% clear. No knots. Knot indicators for knots up to 1-1/2" class are permitted on up to 25% of surface (i.e., on no more than 4 panels 4' long by 1/4 circumference of log). Bark distortions indicating such knots should not exceed 3".	Permits an average of 5 knots under 1-1/2" size class, or 2 knots in 1-1/2" class per 8 ft. block (i.e., a total of 10 small or 4 large knots per log). Unlimited number of knot indicators for knots up to 1-1/2" class permitted. Bark distortions indicating such knots should not exceed 3".
	Sound burls up to 1/4 log circumference permitted. One deductible knot-cluster or burl permitted. No limit on size of knot in deductible cluster or burl.		
	No non-deductible knot clusters permitted.		Each non-deductible knot cluster counts as one knot with diameter of largest knot in cluster.
Peeler Log Requirement	Permit no defect which prevents rotary cutting: e.g., excessive pitch seams, heart rot, deep cat face, excessive sweep or crook.		
	Permits: One pitch seam less than 8 ft.	Permits: One pitch seam over 8 feet or two under 8 feet.	

DOUGLAS-FIR PEELER-SAW LOG GRADES - 16 FOOT LOGS

Log Grade	Number 2 Sawmill	Number 3 Sawmill
Minimum d.i.b.	12"	6"
Defects indicating rot, i.e., conks or swollen knots.	Permitted if log is merchantable.	
Surface Characteristics	A. Construction Lumber Type Log: No limit on number of knots. Knots mostly (50% plus) 2-1/2" class or less. B. Shop & Better Lumber Type Logs: No limit on knot or knot indicator size, provided either: 1. Knot-free areas 6 ft. length by 6" width total 70% or more of surface or: 2. One log face (25% circumference by full length) free of knots (indicators permitted).	Any merchantable sawlog that does not qualify for a higher grade.

TABLE 17. - DISTRIBUTION OF SAWMILL SAMPLE LOGS BY DIAMETER CLASS AND LOG GRADE

OLD GROWTH TREES

Diameter Class (Inches)	Number of Logs by Log Grade				Total Logs
	1 & 2 Peeler	3 Peeler	2 Sawlog	3 Sawlog	
6 - 9				91	91
10 - 13			113	164	277
14 - 17			185	72	257
18 - 21			186	54	240
22 - 25		18	139	59	216
26 - 29		42	100	35	177
30 - 33	5	32	73	30	140
34 - 37	4	15	56	9	84
38 - 41	10	14	34	8	66
42 - 45	4	9	14	4	31
46 - 49	5	3	8	2	18
50 - 53	3	1	5	1	10
54 - 57	1	0	0	0	1
Totals	32	134	913	529	1608

NOTE: Heavy lines enclose log grade-diameter classes included in Tables 4 and 5.

TABLE 18. - DISTRIBUTION OF SAWMILL SAMPLE LOGS BY LENGTH AND LOG GRADE

OLD GROWTH TREES

Length (Feet)	Number of Logs by Log Grade				Total Logs
	1 & 2 Peeler	3 Peeler	2 Sawlog	3 Sawlog	
8	0	0	0	1	1
10	0	1	14	40	55
12	1	1	55	83	140
14	4	3	53	72	132
16	19	116	471	173	779
18	0	1	41	39	81
20	8	12	279	121	420
Total	32	134	913	529	1608

TABLE 19- DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Moulding & Better rough dry, Shop surfaced dry, Dimension surfaced green

RAW DATA - OLD GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
						LOG GRADE 1 & 2 PEELER								
30	4	202	106	221	0	4	57	41	19	71	54	230	192	1201
31	0	202	141	155	1	10	16	2	43	153	74	66	23	886
32	7	115	89	221	0	0	2	6	4	17	15	38	15	529
33	8	74	82	333	3	10	12	1	18	76	63	134	49	863
SUB	19	593	418	930	4	24	87	50	84	317	206	468	279	3479
%	.55	17.05	12.01	26.73	.11	.69	2.50	1.44	2.41	9.11	5.92	13.45	8.02	
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	336	354	175	532	0	2	111	14	28	246	125	351	142	2416
36	0	0	48	343	0	66	88	73	32	200	60	213	0	1123
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	336	354	223	875	0	68	199	87	60	446	185	564	142	3539
%	9.49	10.00	6.30	24.72	0	1.92	5.62	2.46	1.70	12.60	5.23	15.94	4.01	
38	67	812	578	1083	2	4	21	12	86	330	233	454	191	3873
39	78	331	116	263	4	5	0	35	112	24	63	5	50	1086
40	49	370	234	1076	0	2	31	49	33	166	178	541	280	3009
41	446	271	294	933	4	27	64	103	3	39	39	160	138	2521
SUB	640	1784	1222	3355	10	38	116	199	234	559	513	1160	659	10489
%	6.10	17.01	11.65	31.99	.10	.36	1.11	1.90	2.23	5.33	4.89	11.06	6.28	
42	138	445	332	785	0	13	62	67	28	42	69	122	145	2248
43	471	573	174	1014	54	37	6	68	97	90	64	94	73	2815
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	609	1018	506	1799	54	50	68	135	125	132	133	216	218	5063
%	12.03	20.11	9.99	35.53	1.07	.99	1.34	2.67	2.47	2.61	2.63	4.27	4.31	
46	102	486	334	913	0	4	56	39	51	359	298	494	218	3354
47	108	237	179	303	28	66	98	17	3	39	49	133	68	1328
48	551	491	177	408	1	9	14	6	18	92	105	551	477	2900
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	761	1214	690	1624	29	79	168	62	72	490	452	1178	763	7582
%	10.04	16.01	9.10	21.42	.38	1.04	2.22	.82	.95	6.46	5.96	15.54	10.06	
50	3	489	667	838	8	43	103	34	11	79	146	515	245	3181
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	26	339	166	528	0	4	59	55	19	82	65	123	34	1500
SUB	29	828	833	1366	8	47	162	89	30	161	211	638	279	4681
%	.62	17.69	17.80	29.18	.17	1.00	3.46	1.90	.64	3.44	4.51	13.63	5.96	
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	26	280	136	185	0	2	44	64	3	35	48	346	328	1497
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	26	280	136	185	0	2	44	64	3	35	48	346	328	1497
%	1.74	18.70	9.08	12.36	0	.13	2.94	4.28	.20	2.34	3.21	23.11	21.91	
TOT	2420	6071	4028	10134	105	308	844	686	608	2140	1748	4570	2668	36330
%	6.66	16.71	11.09	27.89	.29	.85	2.32	1.89	1.67	5.89	4.81	12.58	7.34	
						LOG GRADE 3 PEELER								
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	61	228	732	883	24	58	296	121	1269	1337	583	731	225	6548
25	12	112	186	190	0	19	29	12	196	565	368	232	118	2039
SUB	73	340	918	1073	24	77	325	133	1465	1902	951	963	343	8587
%	.85	3.96	10.69	12.50	.28	.90	3.78	1.55	17.06	22.15	11.07	11.21	3.99	
26	87	541	906	822	2	45	224	50	425	886	458	695	229	5370
27	76	191	251	752	26	44	146	10	206	463	343	330	101	3139
28	223	637	607	1324	3	222	486	114	623	1730	1039	1194	379	8581
29	133	974	685	1323	11	97	270	60	410	1175	654	1211	599	7602
SUB	519	2543	2449	4221	42	408	1126	234	1664	4254	2494	3430	1308	24692
%	2.10	10.30	9.92	17.09	.17	1.65	4.56	.95	6.74	17.23	10.10	13.89	5.30	
30	134	644	646	1233	33	138	330	65	478	1235	651	603	384	6574
31	23	87	342	952	90	151	398	230	510	838	188	509	181	4499
32	235	704	808	1219	0	141	395	119	450	1058	270	464	90	5953
33	114	264	446	1288	76	199	526	323	69	1260	473	270	248	5556
SUB	506	1699	2242	4692	199	629	1649	737	1507	4391	1582	1846	903	22582
%	2.24	7.52	9.93	20.78	.88	2.79	7.30	3.26	6.67	19.44	7.01	8.17	4.00	
34	90	159	287	861	14	36	191	138	112	524	450	836	335	4033
35	58	295	134	414	0	32	33	18	192	353	323	161	0	2013
36	452	442	485	1175	17	47	317	230	327	503	384	630	175	5184
37	40	126	77	928	4	32	300	159	28	129	43	286	252	2404
SUB	640	1022	983	3378	35	147	841	545	659	1509	1200	1913	762	13634
%	4.69	7.50	7.21	24.78	.26	1.08	6.17	4.00	4.83	11.07	8.80	14.03	5.59	
38	163	609	322	781	19	31	128	24	73	346	264	307	131	3198
39	320	772	564	3058	43	73	269	131	472	690	312	584	141	7429
40	324	409	641	862	40	93	315	56	49	566	325	208	92	3980
41	0	74	90	644	0	42	67	33	20	85	16	94	118	1283
SUB	807	1864	1617	5345	102	239	779	244	614	1687	917	1193	482	15890
%	5.08	11.73	10.18	33.64	.64	1.50	4.90	1.54	3.86	10.62	5.77	7.51	3.03	
42	601	407	427	720	51	161	378	72	146	478	514	874	523	5352
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	4	199	193	462	0	51	51	76	14	98	110	363	208	1829
45	450	231	351	1598	20	27	173	125	0	302	175	353	171	3976
SUB	1055	837	971	2780	71	239	602	273	160	878	799	1590	902	11157
%	9.46	7.50	8.70	24.92	.64	2.14	5.40	2.45	1.43	7.87	7.16	14.25	8.08	
46	0	300	179	803	8	0	68	29	32	240	37	37	0	1733
47	260	596	241	922	1	29	71	13	47	142	183	409	143	3057
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	260	896	420	1725	9	29	139	42	79	382	220	446	143	4790
%	5.43	18.71	8.77	36.01	.19	.61	2.90	.88	1.65	7.97	4.59	9.31	2.99	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	27	83	129	492	0	17	67	4	0	18	50	465	31	1383
SUB	27	83	129	492	0	17	67	4	0	18	50	465	31	1383
%	1.95	6.00	9.33	35.57	0	1.23	4.84	.29	0	1.30	3.62	33.62	2.24	
TOT	3887	9284	9729	23706	482	1785	5528	2212	6148	15021	8213	11846	4874	102715
%	3.78	9.04	9.47	23.08	.47	1.74	5.38	2.15	5.99	14.62	8.00	11.53	4.75	

TABLE 19 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Moulding & Better rough dry, Shop surfaced dry, Dimension surfaced green

RAW DATA - OLD-GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
						LOG GRADE 2 SAWLOG								
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	11	12	46	56	0	0	0	34	457	2940	1210	869	135	5770
13	3	17	44	66	0	24	0	8	643	3918	1630	1114	348	7815
SUB	14	29	90	122	0	24	0	42	1100	6858	2840	1983	483	13585
%	.10	.21	.66	.90	0	.18	0	.31	8.10	50.48	20.91	14.60	3.56	
14	0	24	25	69	0	0	54	51	743	4259	2303	1229	318	9075
15	0	11	43	99	0	0	9	80	837	3493	2313	1480	264	8629
16	13	62	93	74	13	11	77	57	1051	4091	2733	1712	239	10226
17	0	78	113	216	6	28	133	154	1433	4541	2343	1990	390	11425
SUB	13	175	274	458	19	39	273	342	4064	16384	9692	6411	1211	39355
%	.03	.44	.70	1.16	.05	.10	.69	.87	10.33	41.63	24.63	16.29	3.08	
18	0	58	231	270	4	61	300	268	2285	4823	3410	2868	598	15176
19	25	149	408	606	36	101	414	222	1672	5383	3062	2409	593	15080
20	25	115	428	629	18	182	583	426	1761	6037	3480	3299	522	17505
21	51	423	475	351	60	168	544	345	1628	4383	2848	2014	214	13504
SUB	101	745	1542	1856	118	512	1841	1261	7346	20626	12800	10590	1927	61265
%	.16	1.22	2.52	3.03	.19	.84	3.00	2.06	11.99	33.67	20.89	17.29	3.15	
22	41	444	609	772	23	72	1012	312	1233	5069	3733	2801	511	16632
23	83	283	602	832	33	327	1750	631	1795	6507	4030	2723	1113	20709
24	88	190	371	453	56	585	1128	424	699	4542	2758	2923	590	14807
25	75	167	369	536	140	485	1173	542	588	3062	2086	2784	801	12808
SUB	287	1084	1951	2593	252	1469	5063	1909	4315	19180	12607	11231	3015	64956
%	.44	1.67	3.00	3.99	.39	2.26	7.79	2.94	6.64	29.53	19.41	17.29	4.64	
26	168	379	504	729	20	524	1587	216	964	3893	1777	2224	458	13443
27	189	164	384	938	112	643	1607	520	994	3292	2490	2162	852	14347
28	85	213	487	918	292	547	1828	409	1004	3494	2484	3223	935	15919
29	137	373	838	1537	322	1357	2867	642	1010	5142	2822	2378	897	20322
SUB	579	1129	2213	4122	746	3071	7889	1787	3972	15821	9573	9987	3142	64031
%	.90	1.76	3.46	6.44	1.17	4.80	12.32	2.79	6.20	24.71	14.95	15.60	4.91	
30	174	430	393	883	72	976	1364	496	146	2110	1398	1924	613	10979
31	110	437	977	1877	382	1357	2688	594	470	3277	2333	2290	922	17714
32	52	263	623	847	189	1336	2564	616	468	2277	2387	2987	1126	15735
33	185	671	805	1445	149	1252	1833	251	1287	3210	1370	1297	630	14385
SUB	521	1801	2798	5052	792	4921	8449	1957	2371	10874	7488	8498	3291	58813
%	.89	3.06	4.76	8.59	1.35	8.37	14.37	3.33	4.03	18.49	12.73	14.45	5.60	
34	397	596	804	1973	141	1160	2383	547	414	2054	1659	2455	514	15097
35	210	402	589	1542	327	1670	2555	637	287	3913	2086	1808	639	16665
36	42	381	334	1375	272	1194	2100	269	177	1673	1380	1439	717	11353
37	475	922	993	2491	263	1472	1523	410	542	2040	1241	2053	871	15296
SUB	1124	2301	2720	7381	1003	5496	8561	1863	1420	9680	6366	7755	2741	58411
%	1.92	3.94	4.66	12.64	1.72	9.41	14.66	3.19	2.43	16.57	10.90	13.28	4.69	
38	92	716	808	1508	218	1090	1426	363	82	1681	1928	3361	1243	14516
39	85	278	577	1601	351	1277	2092	840	227	1734	1068	2239	1009	13378
40	284	478	354	1244	20	559	1007	175	140	1755	1309	478	201	8004
41	132	225	244	955	87	306	733	189	71	524	401	514	128	4509
SUB	593	1697	1983	5308	676	3232	5258	1567	520	5694	4706	6592	2581	40407
%	1.47	4.20	4.91	13.14	1.67	8.00	13.01	3.88	1.29	14.09	11.65	16.31	6.39	
42	675	465	266	891	126	669	598	189	96	622	407	260	113	5377
43	53	13	34	191	19	64	642	303	0	300	140	69	58	1886
44	10	26	230	715	68	385	828	118	0	308	292	452	214	3646
45	278	524	425	955	212	623	985	161	132	426	542	1030	592	6885
SUB	1016	1028	955	2752	425	1741	3053	771	228	1656	1381	1811	977	17794
%	5.71	5.78	5.37	15.47	2.39	9.78	17.16	4.33	1.28	9.31	7.76	10.18	5.49	
46	182	111	60	388	163	195	50	87	97	726	1072	1303	224	4658
47	30	169	363	779	84	667	279	59	0	264	238	206	121	3259
48	5	0	34	118	13	106	274	129	3	195	422	1120	592	3011
49	14	84	47	98	23	170	458	125	4	44	89	256	63	1475
SUB	231	364	504	1383	283	1138	1061	400	104	1229	1821	2885	1000	12403
%	1.86	2.93	4.06	11.15	2.28	9.18	8.55	3.23	.84	9.91	14.68	23.26	8.06	
50	244	42	313	473	50	220	43	37	0	128	72	216	128	1966
51	65	194	182	441	6	55	210	152	5	57	107	748	649	2871
52	13	14	163	644	7	251	323	109	3	122	117	387	208	2361
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	322	250	658	1558	63	526	576	298	8	307	296	1351	985	7198
%	4.47	3.47	9.14	21.64	.88	7.31	8.00	4.14	.11	4.27	4.11	18.77	13.68	
TOT	4801	10603	15688	32585	4371	22169	42024	12197	25448	108309	69570	69094	21353	438218
%	1.10	2.42	3.58	7.44	1.00	5.06	9.59	2.78	5.81	24.72	15.88	15.77	4.87	

TABLE 19 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Moulding & Better rough dry, Shop surfaced dry, Dimension surfaced green

RAW DATA - OLD-GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
						LOG GRADE 3 SAWLOG								
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	75	52	37	20	184
8	0	0	9	7	13	0	0	0	60	977	416	199	46	1727
9	0	4	6	0	0	0	13	5	69	1519	834	490	99	3039
SUB	0	4	15	7	13	0	13	5	129	2571	1302	726	165	4950
%	0	.08	.30	.14	.26	0	.26	.10	2.61	51.94	26.30	14.67	3.33	
10	8	0	13	16	0	27	22	0	138	2297	1496	1201	275	5493
11	0	27	1	28	0	0	15	11	389	2321	1795	1287	402	6276
12	0	0	3	0	0	0	0	0	82	377	513	396	76	1447
13	0	42	15	6	0	0	0	0	10	281	508	550	131	1543
SUB	8	69	32	50	0	27	37	11	619	5276	4312	3434	884	14759
%	.05	.47	.22	.34	0	.18	.25	.07	4.19	35.75	29.22	23.27	5.99	
14	0	4	13	19	0	15	7	29	8	473	781	871	265	2485
15	0	0	0	0	0	1	7	8	20	739	1535	1375	236	3921
16	0	11	0	2	0	13	29	8	6	478	736	1170	197	2650
17	0	3	7	13	6	5	54	52	38	987	1731	1800	470	5166
SUB	0	18	20	34	6	34	97	97	72	2677	4783	5216	1168	14222
%	0	.13	.14	.24	.04	.24	.68	.68	.51	18.82	33.63	36.68	8.21	
18	0	0	0	0	4	0	23	60	8	358	846	1144	289	2732
19	0	47	0	3	0	0	84	93	2	530	1233	1411	292	3695
20	0	0	25	76	0	2	169	223	100	827	1517	2059	636	5634
21	0	0	0	4	0	2	120	77	94	780	1568	2486	681	5812
SUB	0	47	25	83	4	4	396	453	204	2495	5164	7100	1898	17873
%	0	.26	.14	.46	.02	.02	2.22	2.53	1.14	13.96	28.89	39.72	10.62	
22	0	0	27	25	25	11	354	355	31	1387	1639	1679	466	5999
23	4	8	18	69	7	47	464	424	19	651	1631	2653	653	6648
24	0	4	27	91	5	213	530	325	64	1246	2042	2457	462	7466
25	0	53	56	171	62	115	392	297	93	1293	1934	1903	444	6813
SUB	4	65	128	356	99	386	1740	1401	207	4577	7246	8692	2025	26926
%	.01	.24	.48	1.32	.37	1.43	6.46	5.20	.77	17.00	26.91	32.28	7.52	
26	0	7	61	75	15	88	533	299	10	548	734	1734	545	4649
27	0	54	38	161	51	239	1010	330	138	757	1452	2833	1028	8091
28	3	0	15	143	3	96	419	181	50	351	676	1227	238	3402
29	0	0	26	168	50	288	912	337	22	525	1288	1145	845	5606
SUB	3	61	140	547	119	711	2874	1147	220	2181	4150	6939	2656	21748
%	.01	.28	.64	2.52	.55	3.27	13.22	5.27	1.01	10.03	19.08	31.91	12.21	
30	3	15	13	171	11	340	1305	417	32	702	1339	1713	557	6618
31	23	72	119	272	6	208	1112	390	21	445	1097	2362	1356	7483
32	0	15	57	196	61	296	1441	521	56	799	694	1309	279	5724
33	15	66	63	303	108	197	534	134	84	392	335	878	746	3855
SUB	41	168	252	942	186	1041	4392	1462	193	2338	3465	6262	2938	23680
%	.17	.71	1.06	3.98	.79	4.40	18.55	6.17	.82	9.87	14.63	26.44	12.41	
34	0	0	13	122	0	113	474	93	0	163	307	254	89	1628
35	0	30	30	61	13	146	504	155	23	212	380	1471	668	3693
36	64	12	144	191	2	108	433	106	5	158	147	525	134	2029
37	0	3	6	77	0	78	196	77	0	11	76	241	92	857
SUB	64	45	193	451	15	445	1607	431	28	544	910	2491	983	8207
%	.78	.55	2.35	5.50	.18	5.42	19.58	5.25	.34	6.63	11.09	30.35	11.98	
38	60	5	17	147	228	187	158	137	0	0	59	131	64	1193
39	0	18	51	281	126	202	856	312	4	401	574	947	336	4108
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	4	0	74	107	26	237	484	163	5	102	308	1875	1176	4561
SUB	64	23	142	535	380	626	1498	612	9	503	941	2953	1576	9862
%	.65	.23	1.44	5.42	3.85	6.35	15.19	6.21	.09	5.10	9.54	29.94	15.98	
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	3	27	52	20	141	482	159	5	61	92	292	143	1477
44	0	7	44	176	17	295	846	191	3	43	63	851	984	3520
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	10	71	228	37	436	1328	350	8	104	155	1143	1127	4997
%	0	.20	1.42	4.56	.74	8.73	26.58	7.00	.16	2.08	3.10	22.87	22.55	
46	0	8	32	116	6	67	277	115	5	43	61	182	73	985
47	1	29	102	128	37	203	353	56	5	70	104	232	39	1359
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	1	37	134	244	43	270	630	171	10	113	165	414	112	2344
%	.04	1.58	5.72	10.41	1.83	11.52	26.88	7.30	.43	4.82	7.04	17.66	4.78	
50	0	4	9	149	0	265	638	153	0	0	16	107	92	1433
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	4	9	149	0	265	638	153	0	0	16	107	92	1433
%	0	.28	.63	10.40	0	18.49	44.52	10.68	0	0	1.12	7.47	6.42	
TOT	185	551	1161	3626	902	4245	15250	6293	1899	23379	32609	45477	15624	151001
%	.12	.36	.77	2.40	.60	2.81	10.10	4.17	1.13	15.48	21.60	30.12	10.35	

TABLE 19 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Moulding & Better rough dry, Shop surfaced dry, Dimension surfaced green

RAW DATA - OLD-GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
							LOG GRADE CULL							
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	59	12	71
SUB	0	0	0	0	0	0	0	0	0	0	0	59	12	71
%	0	0	0	0	0	0	0	0	0	0	0	83.10	16.90	
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	3	1	1	0	0	3	12	2	17	25	179	168	411
27	0	0	0	37	0	0	47	35	0	0	5	193	324	641
28	0	0	0	23	0	0	19	19	0	0	48	84	206	399
29	0	0	33	48	0	0	35	60	0	0	0	274	331	781
SUB	0	3	34	109	0	0	104	126	2	17	78	730	1029	2232
%	0	.13	1.52	4.88	0	0	4.66	5.65	.09	.76	3.49	32.71	46.10	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	27	0	0	75	105	0	0	0	79	76	362
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	12	0	0	15	15	19	0	26	71	236	394
SUB	0	0	0	39	0	0	90	120	19	0	26	150	312	756
%	0	0	0	5.16	0	0	11.90	15.87	2.51	0	3.44	19.84	41.27	
34	0	0	7	0	0	15	25	84	0	65	39	385	281	901
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	0	7	0	0	15	25	84	0	65	39	385	281	901
%	0	0	.78	0	0	1.66	2.77	9.32	0	7.21	4.33	42.73	31.19	
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	30	34	80	0	3	32	12	1	15	29	328	348	912
SUB	0	30	34	80	0	3	32	12	1	15	29	328	348	912
%	0	3.29	3.73	8.77	0	.33	3.51	1.32	.11	1.64	3.18	35.96	38.16	
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	4	21	84	171	0	4	53	27	2	16	27	461	532	1402
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	4	21	84	171	0	4	53	27	2	16	27	461	532	1402
%	.29	1.50	5.99	12.20	0	.29	3.78	1.93	.14	1.14	1.93	32.88	37.95	
TOT	4	54	159	399	0	22	304	369	24	113	199	2113	2514	6274
%	.06	.86	2.53	6.36	0	.35	4.85	5.88	.38	1.80	3.17	33.68	40.07	

TABLE 19 - DOUGLAS-FIR LUMBER GRADE RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Moulding & Better rough-dry, Shop surfaced-dry, Dimension surfaced-green

RAW DATA - OLD GROWTH TREES

ALL LOG GRADES COMBINED

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	75	52	37	20	184
8	0	0	9	7	13	0	0	0	60	977	416	199	46	1727
9	0	4	6	0	0	0	13	5	69	1519	834	490	99	3039
SUB	0	4	15	7	13	0	13	5	129	2571	1302	726	165	4950
%	0	.08	.30	.14	.26	0	.26	.10	2.61	51.94	26.30	14.67	3.33	
10	8	0	13	16	0	27	22	0	138	2297	1496	1201	275	5493
11	0	27	1	28	0	0	15	11	389	2321	1795	1287	402	6276
12	11	12	49	56	0	0	0	34	539	3317	1723	1265	211	7217
13	3	59	59	72	0	24	0	8	653	4199	2138	1664	479	9358
SUB	22	98	122	172	0	51	37	53	1719	12134	7152	5417	1367	28344
%	.08	.35	.43	.61	0	.18	.13	.19	6.06	42.81	25.23	19.11	4.82	
14	0	28	38	88	0	15	61	80	751	4732	3084	2100	583	11560
15	0	11	43	99	0	1	16	88	857	4232	3848	2855	500	12550
16	13	73	93	76	13	24	106	65	1057	4569	3469	2882	436	12876
17	0	81	120	229	12	33	187	206	1471	5528	4074	3849	872	16662
SUB	13	193	294	492	25	73	370	439	4136	19061	14475	11686	2391	53648
%	.02	.36	.55	.92	.05	.14	.69	.82	7.71	35.53	26.98	21.78	4.46	
18	0	58	231	270	8	61	323	328	2293	5181	4256	4012	887	17908
19	25	196	408	609	36	101	498	315	1674	5913	4295	3820	885	18775
20	25	115	453	705	18	184	752	649	1861	6864	4997	5358	1158	23139
21	51	423	475	355	60	170	664	422	1722	5163	4416	4500	895	19316
SUB	101	792	1567	1939	122	516	2237	1714	7550	23121	17964	17690	3825	79138
%	.13	1.00	1.98	2.45	.15	.65	2.83	2.17	9.54	29.22	22.70	22.35	4.83	
22	41	444	636	797	48	83	1366	667	1264	6456	5372	4480	977	22631
23	87	291	620	901	40	374	2214	1055	1814	7158	5661	5376	1766	27357
24	149	422	1130	1427	85	856	1954	870	2032	7125	5383	6111	1277	28821
25	87	332	611	897	202	619	1594	851	877	4920	4388	4919	1363	21660
SUB	364	1489	2997	4022	375	1932	7128	3443	5987	25659	20804	20886	5383	100469
%	.36	1.48	2.98	4.00	.37	1.92	7.09	3.43	5.96	25.54	20.71	20.79	5.36	
26	255	930	1472	1627	37	657	2347	577	1401	5344	2994	4832	1400	23873
27	265	609	673	1888	189	926	2810	895	1338	4512	4290	5518	2305	26218
28	311	850	1109	2408	298	865	2752	723	1677	5575	4247	5728	1758	28301
29	270	1347	1582	3076	383	1742	4084	1099	1442	6842	4764	5008	2672	34311
SUB	1101	3736	4836	8999	907	4190	11993	3294	5858	22273	16295	21086	8135	112703
%	.98	3.31	4.29	7.98	.80	3.72	10.64	2.92	5.20	19.76	14.46	18.71	7.22	
30	315	1291	1158	2508	116	1458	3056	1019	675	4118	3442	4470	1746	25372
31	156	798	1579	3283	479	1726	4289	1321	1044	4713	3692	5306	2558	30944
32	294	1097	1577	2483	250	1773	4402	1262	978	4151	3366	4798	1510	27941
33	322	1075	1396	3381	336	1658	2920	724	1477	4938	2267	2650	1909	25053
SUB	1087	4261	5710	11655	1181	6615	14667	4326	4174	17920	12767	17224	7723	109310
%	.99	3.90	5.22	10.66	1.08	6.05	13.42	3.96	3.82	16.39	11.68	15.76	7.07	
34	487	755	1111	2956	155	1324	3073	862	526	2806	2455	3930	1219	21659
35	604	1081	928	2549	340	1850	3203	824	530	4724	2914	3791	1449	24787
36	558	835	1011	3084	291	1415	2938	678	541	2534	1971	2807	1026	19689
37	515	1051	1076	3496	267	1582	2019	646	570	2180	1360	2580	1215	18557
SUB	2164	3722	4126	12085	1053	6171	11233	3010	2167	12244	8700	13108	4909	84692
%	2.56	4.39	4.87	14.27	1.24	7.29	13.26	3.55	2.56	14.46	10.27	15.48	5.80	
38	382	2142	1725	3519	467	1312	1733	536	241	2357	2484	4253	1629	22780
39	483	1399	1308	5203	524	1557	3217	1318	815	2849	2017	3775	1536	26001
40	657	1257	1229	3182	60	654	1353	280	222	2487	1812	1227	573	14993
41	582	600	736	2719	117	615	1380	500	100	765	793	2971	1908	13786
SUB	2104	5398	4998	14623	1168	4138	7683	2634	1378	8458	7106	12226	5646	77560
%	2.71	6.96	6.44	18.85	1.51	5.34	9.91	3.40	1.78	10.91	9.16	15.76	7.28	
42	1414	1317	1025	2396	177	843	1038	328	270	1142	990	1256	781	12977
43	524	589	235	1257	93	242	1130	530	102	451	296	455	274	6178
44	18	253	551	1524	85	735	1778	412	19	465	492	2127	1938	10397
45	728	755	776	2553	232	650	1158	286	132	728	717	1383	763	10861
SUB	2684	2914	2587	7730	587	2470	5104	1556	523	2786	2495	5221	3756	40413
%	6.64	7.21	6.40	19.13	1.45	6.11	12.63	3.85	1.29	6.89	6.17	12.92	9.29	
46	284	905	605	2220	177	266	451	270	185	1368	1468	2016	515	10730
47	399	1031	885	2132	150	965	801	145	55	515	574	980	371	9003
48	556	491	211	526	14	115	288	135	21	287	527	1671	1069	5911
49	14	84	47	98	23	170	458	125	4	44	89	256	63	1475
SUB	1253	2511	1748	4976	364	1516	1998	675	265	2214	2658	4923	2018	27119
%	4.62	9.26	6.45	18.35	1.34	5.59	7.37	2.49	.98	8.16	9.80	18.15	7.44	
50	247	535	989	1460	58	528	784	224	11	207	234	838	465	6580
51	65	194	182	441	6	55	210	152	5	57	107	748	649	2871
52	13	14	163	644	7	251	323	109	3	122	117	387	208	2361
53	53	422	295	1020	0	21	126	59	19	100	115	588	65	2883
SUB	378	1165	1629	3565	71	855	1443	544	38	486	573	2561	1387	14695
%	2.57	7.93	11.09	24.26	.48	5.82	9.82	3.70	.26	3.31	3.90	17.43	9.44	
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	26	280	136	185	0	2	44	64	3	35	48	346	328	1497
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	26	280	136	185	0	2	44	64	3	35	48	346	328	1497
%	1.74	18.70	9.08	12.36	0	.13	2.94	4.28	.20	2.34	3.21	23.11	21.91	
TOT	11297	26563	30765	70450	5865	28529	63950	21757	33927	148962	112339	133100	47033	734538
%	1.54	3.62	4.19	9.59	.80	3.88	8.71	2.96	4.62	20.28	15.29	18.12	6.40	

TABLE 20 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Shop and Better surfaced dry, Dimension surfaced green

RAW DATA - OLD-GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	Sel Str	Const	Std	Util	Econ	Total
LOG GRADE 1 & 2 PEELER														
30	30	151	157	170	1	5	62	43	19	70	54	230	192	1184
31	29	155	158	129	1	11	20	4	43	153	74	66	23	866
32	20	104	123	159	1	1	7	8	4	17	15	39	15	513
33	15	89	129	227	4	11	20	4	18	75	63	134	49	838
SUB	94	499	567	685	7	28	109	59	84	315	206	469	279	3401
%	2.76	14.67	16.67	20.14	.21	.82	3.20	1.73	2.47	9.26	6.06	13.79	8.20	
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	101	454	303	473	0	3	115	18	28	247	125	353	142	2362
36	0	33	23	316	0	66	88	73	32	200	60	200	0	1091
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	101	487	326	789	0	69	203	91	60	447	185	553	142	3453
%	2.92	14.10	9.44	22.85	0	2.00	5.88	2.64	1.74	12.95	5.36	16.02	4.11	
38	134	689	752	816	5	10	46	25	87	330	233	454	193	3774
39	83	242	201	200	7	9	6	44	112	24	63	7	50	1048
40	67	364	450	741	3	5	55	58	33	166	179	542	279	2942
41	207	454	482	680	8	37	85	122	3	39	40	165	138	2460
SUB	491	1749	1885	2437	23	61	192	249	235	559	515	1168	660	10224
%	4.80	17.11	18.44	23.84	.22	.60	1.88	2.44	2.30	5.47	5.04	11.42	6.46	
42	51	405	451	697	1	15	70	73	28	42	69	122	145	2169
43	297	598	475	722	57	41	26	81	97	90	65	97	73	2719
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	348	1003	926	1419	58	56	96	154	125	132	134	219	218	4888
%	7.12	20.52	18.94	29.03	1.19	1.15	1.96	3.15	2.56	2.70	2.74	4.48	4.46	
46	91	459	513	670	3	8	78	52	51	359	297	495	218	3294
47	52	236	235	260	29	68	105	20	3	39	49	134	68	1298
48	152	573	440	382	3	10	24	12	18	92	105	553	477	2841
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	295	1268	1188	1312	35	86	207	84	72	490	451	1182	763	7433
%	3.97	17.06	15.98	17.65	.47	1.16	2.78	1.13	.97	6.59	6.07	15.90	10.27	
50	95	530	653	644	6	29	104	46	11	79	146	518	245	3106
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	54	271	290	381	2	7	71	67	19	82	65	125	34	1468
SUB	149	801	943	1025	8	36	175	113	30	161	211	643	279	4574
%	3.26	17.51	20.62	22.41	.17	.79	3.83	2.47	.66	3.52	4.61	14.06	6.10	
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	43	205	189	157	1	4	49	68	3	35	48	347	328	1477
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	43	205	189	157	1	4	49	68	3	35	48	347	328	1477
%	2.91	13.88	12.80	10.63	.07	.27	3.32	4.60	.20	2.37	3.25	23.49	22.21	
TOT	1521	6012	6024	7824	132	340	1031	818	699	2139	1750	4581	2669	35450
%	4.29	16.96	16.99	22.07	0.37	0.96	2.91	2.31	1.72	6.03	4.94	12.92	7.53	
LOG GRADE 3 PEELER														
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	97	297	642	782	34	58	283	125	1269	1338	583	733	226	6467
25	29	118	165	150	0	21	32	22	196	565	368	232	118	2016
SUB	126	415	807	932	34	79	315	147	1465	1903	951	965	344	8483
%	1.49	4.89	9.51	10.99	.40	.93	3.71	1.73	17.27	22.43	11.21	11.38	4.06	
26	90	691	640	751	3	47	233	56	425	886	458	712	228	5220
27	55	353	393	554	29	49	156	26	206	463	343	333	101	3061
28	201	688	683	995	7	229	502	132	617	1713	1032	1192	379	8370
29	166	841	897	1054	16	105	258	70	411	1176	653	1236	600	7483
SUB	512	2573	2613	3354	55	430	1149	284	1659	4238	2486	3473	1308	24134
%	2.12	10.66	10.83	13.90	.23	1.78	4.76	1.18	6.87	17.56	10.30	14.39	5.42	
30	141	613	683	1070	37	145	346	82	479	1235	650	624	384	6489
31	16	194	298	705	96	157	407	247	510	838	188	533	181	4370
32	248	667	647	1119	8	149	413	136	450	1058	270	467	90	5722
33	34	330	531	1035	83	211	547	347	69	1260	473	274	248	5442
SUB	439	1804	2159	3929	224	662	1713	812	1508	4391	1581	1898	903	22023
%	1.99	8.19	9.80	17.84	1.02	3.01	7.78	3.69	6.85	19.94	7.18	8.62	4.10	
34	41	279	366	611	14	44	204	152	112	525	450	841	335	3974
35	51	173	213	410	0	32	33	18	192	353	323	168	0	1966
36	185	811	586	817	20	52	330	241	327	502	384	631	175	5061
37	26	284	122	665	4	39	304	172	28	129	43	289	252	2357
SUB	303	1547	1287	2503	38	167	871	583	659	1509	1200	1929	762	13358
%	2.27	11.58	9.63	18.74	.28	1.25	6.52	4.36	4.93	11.30	8.98	14.44	5.70	
38	150	698	377	552	23	36	137	37	73	345	264	309	132	3133
39	289	1155	818	2263	47	88	285	164	472	690	312	586	141	7310
40	332	604	250	760	48	98	322	66	49	566	325	210	92	3722
41	10	101	83	553	0	42	67	33	20	85	16	99	118	1227
SUB	781	2558	1528	4128	118	264	811	300	614	1686	917	1204	483	15392
%	5.07	16.62	9.93	26.82	.77	1.72	5.27	1.95	3.99	10.95	5.96	7.82	3.14	
42	406	624	400	562	56	166	389	82	146	477	514	809	522	5233
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	28	183	255	332	3	56	61	84	15	98	110	364	208	1797
45	215	726	135	1728	20	27	173	125	0	302	175	341	171	4138
SUB	649	1533	790	2622	79	249	623	291	161	877	799	1594	901	11168
%	5.81	13.73	7.07	23.48	.71	2.23	5.58	2.61	1.44	7.85	7.15	14.27	8.07	
46	26	271	325	555	12	11	81	50	32	240	37	42	0	1682
47	275	597	380	738	1	16	56	15	47	142	183	409	143	3002
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	301	868	705	1293	13	27	137	65	79	382	220	451	143	4684
%	6.43	18.53	15.05	27.60	.28	.58	2.92	1.39	1.69	8.16	4.70	9.63	3.05	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	75	149	43	462	0	17	67	4	0	18	50	465	31	1381
SUB	75	149	43	462	0	17	67	4	0	18	50	465	31	1381
%	5.43	10.79	3.11	33.45	0	1.23	4.85	.29	0	1.30	3.62	33.67	2.24	
TOT	3186	11447	9932	19223	561	1895	5686	2486	6145	15004	8204	11979	4875	100623
%	3.17	11.38	9.87	19.10	.56	1.88	5.65	2.47	6.11	14.91	8.15	11.90	4.84	

TABLE 20 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT

Shop and Better surfaced dry, Dimension surfaced green

RAW DATA - OLD-GROWTH TREES

Diam.	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	Sel Str	Const	Std	Util	Econ	Total
LOG GRADE 2 SAWLOG														
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	11	17	45	61	0	0	0	34	457	2940	1211	868	135	5779
13	4	17	41	50	0	24	0	9	643	3917	1628	1114	348	7795
SUB	15	34	86	111	0	24	0	43	1100	6857	2839	1982	483	13574
%	.11	.25	.63	.82	0	.18	0	.32	8.10	50.52	20.91	14.60	3.56	
14	15	22	31	37	0	0	54	52	743	4259	2303	1229	317	9062
15	0	12	43	34	0	0	11	80	837	3491	2309	1484	264	8565
16	5	61	81	66	13	11	79	57	1051	4091	2733	1712	239	10199
17	7	75	136	192	6	28	133	156	1434	4541	2345	1988	390	11431
SUB	27	170	291	329	19	39	277	345	4065	16382	9690	6413	1210	39287
%	.07	.43	.74	.84	.05	.10	.71	.88	10.35	41.73	24.68	16.34	3.08	
18	4	62	189	208	6	61	304	270	2286	4823	3409	2869	597	15088
19	9	234	388	449	39	106	419	230	1672	5382	3061	2408	593	14990
20	14	162	360	523	20	185	592	434	1761	6038	3480	3275	522	17366
21	102	331	400	286	66	169	554	355	1629	4382	2849	2014	214	13351
SUB	129	789	1337	1466	131	521	1869	1289	7348	20625	12799	10566	1926	60795
%	.21	1.30	2.20	2.41	.22	.86	3.07	2.12	12.09	33.93	21.05	17.38	3.17	
22	53	364	612	592	29	75	1028	324	1233	5070	3733	2801	511	16425
23	62	350	402	704	39	327	1763	641	1795	6507	4030	2723	1113	20456
24	68	281	313	380	58	585	1130	428	699	4543	2758	2924	591	14758
25	83	189	347	473	144	488	1181	551	588	3062	2087	2795	803	12791
SUB	266	1184	1674	2149	270	1475	5102	1944	4315	19182	12608	11243	3018	64430
%	.41	1.84	2.60	3.34	.42	2.29	7.92	3.02	6.70	29.77	19.57	17.45	4.68	
26	190	398	467	634	23	526	1598	220	964	3893	1778	2224	458	13373
27	139	334	332	678	114	647	1614	527	994	3292	2490	2176	853	14190
28	42	289	471	741	298	550	1840	421	1005	3494	2484	3221	935	15791
29	75	619	698	1242	335	1367	2883	662	1010	5142	2821	2401	898	20153
SUB	446	1640	1968	3295	770	3090	7935	1830	3973	15821	9573	10022	3144	63507
%	.70	2.58	3.10	5.19	1.21	4.87	12.49	2.88	6.26	24.91	15.07	15.78	4.95	
30	147	401	399	832	73	975	1369	499	146	2110	1398	1949	612	10910
31	117	634	975	1442	395	1373	2717	626	470	3274	2331	2292	922	17568
32	64	337	475	841	191	1342	2577	627	468	2277	2387	2989	1126	15701
33	178	720	751	1290	155	1270	1845	266	1287	3210	1370	1299	630	14271
SUB	506	2092	2600	4405	814	4960	8508	2018	2371	10871	7486	8529	3290	58450
%	.87	3.58	4.45	7.54	1.39	8.49	14.56	3.45	4.06	18.60	12.81	14.59	5.63	
34	310	732	816	1646	147	1172	2403	570	414	2054	1659	2456	515	14894
35	195	476	512	1224	335	1678	2588	654	287	3913	2086	1875	639	16462
36	66	367	452	1103	275	1204	2113	288	177	1673	1379	1441	717	11255
37	464	1130	908	2022	273	1488	1555	446	542	2040	1241	2075	871	15055
SUB	1035	2705	2688	5995	1030	5542	8659	1958	1420	9680	6365	7847	2742	57666
%	1.79	4.69	4.66	10.40	1.79	9.61	15.02	3.40	2.46	16.79	11.04	13.61	4.75	
38	139	659	874	1137	228	1100	1454	391	81	1682	1928	3361	1242	14276
39	130	386	521	1364	358	1282	2115	856	227	1734	1067	2239	1009	13288
40	255	485	525	888	25	569	1020	195	140	1755	1309	517	201	7884
41	150	334	279	711	89	314	741	201	71	524	400	515	128	4457
SUB	674	1864	2199	4100	700	3265	5330	1643	519	5695	4704	6632	2580	39905
%	1.69	4.67	5.51	10.27	1.75	8.18	13.36	4.12	1.30	14.27	11.79	16.62	6.47	
42	738	430	298	750	129	675	606	200	96	622	407	263	113	5327
43	85	47	10	187	19	64	642	303	0	300	140	69	58	1924
44	11	138	207	536	70	390	834	125	0	308	292	484	214	3509
45	147	508	546	807	214	629	998	174	132	426	542	1034	592	6749
SUB	981	1123	1061	2280	432	1758	3080	802	228	1656	1381	1850	977	17609
%	5.57	6.38	6.03	12.95	2.45	9.98	17.49	4.55	1.29	9.40	7.84	10.51	5.55	
46	297	10	72	340	163	195	50	87	97	726	1072	1368	224	4701
47	66	189	340	690	87	674	287	72	0	264	238	208	121	3236
48	2	9	21	45	13	106	310	128	3	195	422	1120	592	2966
49	13	62	65	93	23	170	459	125	4	44	89	256	63	1466
SUB	378	270	498	1168	286	1145	1106	412	104	1229	1821	2952	1000	12369
%	3.06	2.18	4.03	9.44	2.31	9.26	8.94	3.33	.84	9.94	14.72	23.87	8.08	
50	164	132	55	596	50	236	43	37	0	128	72	216	128	1857
51	41	209	251	329	7	57	219	156	5	57	107	749	649	2836
52	7	49	105	571	7	252	327	113	3	122	117	394	208	2275
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	212	390	411	1496	64	545	589	306	8	307	296	1359	985	6968
%	3.04	5.60	5.90	21.47	.92	7.82	8.45	4.39	.11	4.41	4.25	19.50	14.14	
TOT	4669	12261	14813	26794	4519	22364	42455	12590	25451	108305	69562	69395	21355	434830
%	1.07	2.82	3.41	6.17	1.04	5.15	9.77	2.90	5.86	24.92	16.01	15.97	4.91	

TABLE 20 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT
Shop and Better surfaced dry, Dimension surfaced green
RAW DATA - OLD-GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
						LOG GRADE 3 SAWLOG								
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	75	52	37	20	184
8	0	2	8	31	13	0	0	0	60	977	416	199	46	1752
9	0	2	5	13	0	0	13	5	69	1519	834	499	99	3058
SUB	0	4	13	44	13	0	13	5	129	2571	1302	735	165	4994
%	0	.08	.26	.88	.26	0	.26	.10	2.58	51.48	26.07	14.72	3.30	
10	8	1	1	5	0	4	22	0	138	2297	1496	1200	275	5447
11	2	16	9	12	0	0	15	11	389	2322	1796	1284	403	6259
12	0	0	2	0	0	0	0	0	82	377	513	395	76	1445
13	4	23	23	4	0	0	0	0	10	281	508	549	131	1533
SUB	14	40	35	21	0	4	37	11	619	5277	4313	3428	885	14684
%	.10	.27	.24	.14	0	.03	.25	.07	4.22	35.94	29.37	23.35	6.03	
14	0	3	10	2	0	15	8	29	8	474	781	871	265	2466
15	0	0	0	0	0	1	6	7	20	738	1535	1374	236	3917
16	1	6	3	3	0	13	29	8	6	478	736	1170	197	2650
17	0	4	7	12	6	5	54	52	38	987	1731	1800	471	5167
SUB	1	13	20	17	6	34	97	96	72	2677	4783	5215	1169	14200
%	.01	.09	.14	.12	.04	.24	.68	.68	.51	18.85	33.68	36.73	8.23	
18	0	0	0	0	4	0	23	60	9	358	846	1143	288	2731
19	3	25	11	3	0	0	84	93	2	530	1233	1411	292	3687
20	0	9	37	31	0	2	168	223	100	827	1517	2060	635	5609
21	0	0	1	3	0	2	120	77	94	780	1568	2488	681	5814
SUB	3	34	49	37	4	4	395	453	205	2495	5164	7102	1896	17841
%	.02	.19	.27	.21	.02	.02	2.21	2.54	1.15	13.98	28.94	39.81	10.63	
22	1	8	17	23	25	11	356	354	31	1387	1639	1680	466	5998
23	4	15	22	64	7	47	464	425	19	651	1631	2663	654	6666
24	0	11	51	47	5	213	531	325	64	1246	2042	2457	462	7454
25	0	68	48	137	62	115	394	296	93	1293	1934	1921	445	6806
SUB	5	102	138	271	99	386	1745	1400	207	4577	7246	8721	2027	26924
%	.02	.38	.51	1.01	.37	1.43	6.48	5.20	.77	17.00	26.91	32.39	7.53	
26	2	20	38	60	15	88	532	300	10	548	734	1734	545	4626
27	4	33	77	124	51	239	1010	332	138	757	1452	2834	1027	8078
28	0	26	14	116	3	95	418	181	50	351	676	1227	238	3395
29	0	15	34	137	51	288	913	340	22	525	1288	1145	845	5603
SUB	6	94	163	437	120	710	2873	1153	220	2181	4150	6940	2655	21702
%	.03	.43	.75	2.01	.55	3.27	13.24	5.31	1.01	10.05	19.12	31.98	12.23	
30	3	11	26	138	11	340	1305	417	32	702	1339	1725	558	6607
31	12	91	127	211	6	210	1113	393	21	444	1098	2372	1355	7453
32	2	34	39	146	61	296	1441	522	56	799	694	1310	279	5679
33	15	56	100	251	110	198	536	138	84	392	335	895	746	3856
SUB	32	192	292	746	188	1044	4395	1470	193	2337	3466	6302	2938	23595
%	.14	.81	1.24	3.16	.80	4.42	18.63	6.23	.82	9.90	14.69	26.71	12.45	
34	0	11	18	106	0	113	474	94	0	163	307	254	89	1629
35	4	24	39	43	13	146	503	155	23	212	380	1471	668	3681
36	47	58	136	141	5	111	440	113	5	158	147	526	134	2021
37	0	11	17	51	0	79	196	78	0	11	76	241	92	852
SUB	51	104	210	341	18	449	1613	440	28	544	910	2492	983	8183
%	.62	1.27	2.57	4.17	.22	5.49	19.71	5.38	.34	6.65	11.12	30.45	12.01	
38	43	38	36	97	228	188	160	140	0	0	59	132	64	1185
39	2	37	77	238	126	204	860	316	4	401	574	953	336	4128
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	4	23	21	78	26	236	483	163	5	102	308	1926	1175	4550
SUB	49	98	134	413	380	628	1503	619	9	503	941	3011	1575	9863
%	.50	.99	1.36	4.19	3.85	6.37	15.24	6.28	.09	5.10	9.54	30.53	15.97	
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	6	20	53	20	140	482	159	5	61	92	292	143	1473
44	2	17	42	132	17	295	848	193	3	43	63	893	983	3531
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	2	23	62	185	37	435	1330	352	8	104	155	1185	1126	5004
%	.04	.46	1.24	3.70	.74	8.69	26.58	7.03	.16	2.08	3.10	23.68	22.50	
46	3	19	41	86	6	67	279	116	5	43	61	182	73	981
47	8	46	76	117	37	203	354	58	5	70	104	232	39	1349
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	11	65	117	203	43	270	633	174	10	113	165	414	112	2330
%	.47	2.79	5.02	8.71	1.85	11.59	27.17	7.47	.43	4.85	7.08	17.77	4.81	
50	0	4	8	55	0	265	638	153	0	0	16	147	92	1378
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	4	8	55	0	265	638	153	0	0	16	147	92	1378
%	0	.29	.58	3.99	0	19.23	46.30	11.10	0	0	1.16	10.67	6.68	
TOT	174	773	1241	2770	908	4229	15272	6326	1700	23379	32611	45692	15623	150698
%	.12	.51	.82	1.84	.60	2.81	10.13	4.20	1.13	15.51	21.64	30.32	10.37	

TABLE 20 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT
Shop and Better surfaced dry, Dimension surfaced green
RAW DATA - OLD-GROWTH TREES

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
							LOG GRADE CULL							
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	59	12	71
SUB	0	0	0	0	0	0	0	0	0	0	0	59	12	71
%	0	0	0	0	0	0	0	0	0	0	0	83.10	16.90	
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	2	2	1	0	0	3	13	2	17	25	179	168	412
27	0	0	0	15	0	0	37	15	0	0	5	193	324	589
28	0	8	0	13	0	0	19	0	0	0	48	84	206	378
29	0	0	22	80	0	0	0	37	0	0	0	274	331	744
SUB	0	10	24	109	0	0	59	65	2	17	78	730	1029	2123
%	0	.47	1.13	5.13	0	0	2.78	3.06	.09	.80	3.67	34.39	48.47	
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	10	0	17	0	0	17	58	0	0	0	79	76	257
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	5	0	0	0	0	0	0	15	19	0	26	71	236	372
SUB	5	10	0	17	0	0	17	73	19	0	26	150	312	629
%	.79	1.59	0	2.70	0	0	2.70	11.61	3.02	0	4.13	23.85	49.60	
34	5	0	0	0	0	15	0	38	0	65	39	407	281	850
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	5	0	0	0	0	15	0	38	0	65	39	407	281	850
%	.59	0	0	0	0	1.76	0	4.47	0	7.65	4.59	47.88	33.06	
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	6	30	41	57	0	3	34	13	1	15	29	328	349	906
SUB	6	30	41	57	0	3	34	13	1	15	29	328	349	906
%	.66	3.31	4.53	6.29	0	.33	3.75	1.43	.11	1.66	3.20	36.20	38.52	
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	7	50	84	122	1	5	57	29	2	16	27	461	532	1393
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	7	50	84	122	1	5	57	29	2	16	27	461	532	1393
%	.50	3.59	6.03	8.76	.07	.36	4.09	2.08	.14	1.15	1.94	33.09	38.19	
TOT	23	100	149	305	1	23	167	218	24	113	199	2135	2515	5972
%	.39	1.67	2.49	5.11	.02	.39	2.80	3.65	.40	1.89	3.33	35.75	42.11	

TABLE 20 - DOUGLAS-FIR LUMBER RECOVERY BY 1 AND 4-INCH DIAMETER CLASSES IN BOARD FEET AND PERCENT
Shop and Better surfaced-dry, Dimension surfaced-green
RAW DATA - OLD-GROWTH TREES

ALL LOG GRADES COMBINED

Diam	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	SelStr	Const	Std	Util	Econ	Total
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	75	52	37	20	184
8	0	2	8	31	13	0	0	0	60	977	416	199	46	1752
9	0	2	5	13	0	0	13	5	69	1519	834	499	99	3058
SUB	0	4	13	44	13	0	13	5	129	2571	1302	735	165	4994
%	0	.08	.26	.88	.26	0	.26	.10	2.58	51.48	26.07	14.72	3.30	
10	8	1	1	5	0	4	22	0	138	2297	1496	1200	275	5447
11	2	16	9	12	0	0	15	11	389	2322	1796	1284	403	6259
12	11	17	47	61	0	0	0	34	539	3317	1724	1263	211	7224
13	8	40	64	54	0	24	0	9	653	4198	2136	1663	479	9328
SUB	29	74	121	132	0	28	37	54	1719	12134	7152	5410	1368	28258
%	.10	.26	.43	.47	0	.10	.13	.19	6.08	42.94	25.31	19.15	4.84	
14	15	25	41	39	0	15	62	81	751	4733	3084	2100	582	11528
15	0	12	43	34	0	1	17	87	857	4229	3844	2858	500	12482
16	6	67	84	69	13	24	108	65	1057	4569	3469	2882	436	12849
17	7	79	143	204	12	33	187	208	1472	5528	4076	3847	873	16669
SUB	28	183	311	346	25	73	374	441	4137	19059	14473	11687	2391	53528
%	.05	.34	.58	.65	.05	.14	.70	.82	7.73	35.61	27.04	21.83	4.47	
18	4	62	189	208	10	61	327	330	2295	5181	4255	4012	885	17819
19	12	259	399	452	39	106	503	323	1674	5912	4294	3819	885	18677
20	14	171	397	554	20	187	760	657	1861	6865	4997	5335	1157	22975
21	102	331	401	289	66	171	674	432	1723	5162	4417	4502	895	19165
SUB	132	823	1386	1503	135	525	2264	1742	7553	23120	17963	17668	3822	78636
%	.17	1.05	1.76	1.91	.17	.67	2.88	2.22	9.61	29.40	22.84	22.47	4.86	
22	54	372	629	615	54	86	1384	678	1264	6457	5372	4481	977	22423
23	66	365	424	768	46	374	2227	1066	1814	7158	5661	5386	1767	27122
24	165	589	1006	1209	97	856	1944	878	2032	7127	5383	6114	1279	28679
25	112	375	560	760	206	624	1607	869	877	4920	4389	4948	1366	21613
SUB	397	1701	2619	3352	403	1940	7162	3491	5987	25662	20805	20929	5389	99837
%	.40	1.70	2.62	3.36	.40	1.94	7.17	3.50	6.00	25.70	20.84	20.96	5.40	
26	282	1111	1147	1446	41	661	2366	589	1401	5344	2995	4849	1399	23631
27	198	720	802	1371	194	935	2817	900	1338	4512	4290	5536	2305	25918
28	243	1011	1168	1865	308	874	2779	734	1672	5558	4240	5724	1758	27934
29	241	1475	1651	2513	402	1760	4054	1109	1443	6843	4762	5056	2674	33983
SUB	964	4317	4768	7195	945	4230	12016	3332	5854	22257	16287	21165	8136	111466
%	.86	3.87	4.28	6.45	.85	3.79	10.78	2.99	5.25	19.97	14.61	18.99	7.30	
30	321	1176	1265	2210	122	1465	3082	1041	676	4117	3441	4528	1746	25190
31	174	1084	1558	2504	498	1751	4274	1328	1044	4709	3691	5342	2557	30514
32	334	1142	1284	2265	261	1788	4438	1293	978	4151	3366	4805	1510	27615
33	247	1195	1511	2803	352	1690	2948	770	1477	4937	2267	2673	1909	24779
SUB	1076	4597	5618	9782	1233	6694	14742	4432	4175	17914	12765	17348	7722	108098
%	1.00	4.25	5.20	9.05	1.14	6.19	13.64	4.10	3.86	16.57	11.81	16.05	7.14	
34	356	1022	1200	2363	161	1344	3081	854	526	2807	2455	3958	1220	21347
35	351	1127	1067	2150	348	1859	3239	845	530	4725	2914	3867	1449	24471
36	298	1269	1197	2377	300	1433	2971	715	541	2533	1970	2798	1026	19428
37	490	1425	1047	2738	277	1606	2055	696	570	2180	1360	2605	1215	18264
SUB	1495	4843	4511	9628	1086	6242	11346	3110	2167	12245	8699	13228	4910	83510
%	1.79	5.80	5.40	11.53	1.30	7.47	13.59	3.72	2.59	14.66	10.42	15.84	5.88	
38	466	2084	2039	2602	484	1334	1797	593	241	2357	2484	4256	1631	22368
39	504	1820	1617	4065	538	1583	3266	1380	815	2849	2016	3785	1536	25774
40	654	1453	1225	2389	76	672	1397	319	222	2487	1813	1269	572	14548
41	377	942	906	2079	123	632	1410	532	100	765	793	3033	1908	13600
SUB	2001	6299	5787	11135	1221	4221	7870	2824	1378	8458	7106	12343	5647	76290
%	2.62	8.26	7.59	14.60	1.60	5.53	10.32	3.70	1.81	11.09	9.31	16.18	7.40	
42	1195	1459	1149	2009	186	856	1065	355	270	1141	990	1274	780	12729
43	382	651	505	962	96	245	1150	543	102	451	297	458	274	6116
44	48	388	588	1122	91	746	1800	431	20	465	492	2202	1937	10330
45	362	1234	681	2535	234	656	1171	299	132	728	717	1375	763	10887
SUB	1987	3732	2923	6628	607	2503	5186	1628	524	2785	2496	5309	3754	40062
%	4.96	9.32	7.30	16.54	1.52	6.25	12.94	4.06	1.31	6.95	6.23	13.25	9.37	
46	417	759	951	1651	184	281	488	305	185	1368	1467	2087	515	10658
47	401	1068	1031	1805	154	961	802	165	55	515	574	983	371	8885
48	154	582	461	427	16	116	334	140	21	287	527	1673	1069	5807
49	13	62	65	93	23	170	459	125	4	44	89	256	63	1466
SUB	985	2471	2508	3976	377	1528	2083	735	265	2214	2657	4999	2018	26816
%	3.67	9.21	9.35	14.83	1.41	5.70	7.77	2.74	.99	8.26	9.91	18.64	7.53	
50	259	666	716	1295	56	530	785	236	11	207	234	881	465	6341
51	41	209	251	329	7	57	219	156	5	57	107	749	649	2836
52	7	49	105	571	7	252	327	113	3	122	117	394	208	2275
53	129	420	333	843	2	24	138	71	19	100	115	590	65	2849
SUB	436	1344	1405	3038	72	863	1469	576	38	486	573	2614	1387	14301
%	3.05	9.40	9.82	21.24	.50	6.03	10.27	4.03	.27	3.40	4.01	18.28	9.70	
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	43	205	189	157	1	4	49	68	3	35	48	347	328	1477
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUB	43	205	189	157	1	4	49	68	3	35	48	347	328	1477
%	2.91	13.88	12.80	10.63	.07	.27	3.32	4.60	.20	2.37	3.25	23.49	22.21	
TOT	9573	30593	32159	56916	6118	28851	64611	22438	33929	148940	112326	133782	47037	727273
%	1.32	4.21	4.42	7.83	.84	3.97	8.88	3.09	4.67	20.48	15.44	18.40	6.47	

TABLE 21 - 1967 DOUGLAS-FIR LUMBER GRADE SELLING PRICES [1/]

Lumber Grade	Selling Price-$/M
B and Better	137.63
C	137.63
D	137.63
Moulding	131.95
3 Clear	106.89
1 Shop	98.07
2 Shop	71.38
3 Shop	48.97
Select Structural	77.89
Construction	77.89
Standard	77.89
Utility	50.26
Economy	29.63

1/ Selling prices are averages for the California Region as collected from cooperating timber operators.

TABLE 22. - DISTRIBUTION OF VENEER SAMPLE LOGS BY DIAMETER CLASS AND LOG GRADE

Diameter Class (Inches)	1 & 2 Peeler	3 Peeler	2 Sawlog	3 Sawlog	Total Logs
6 - 9				1	1
10 - 13			13	10	23
14 - 17			75	30	105
18 - 21			110	34	144
22 - 25		11	90	14	115
26 - 29		21	45	10	76
30 - 33		17	35	6	58
34 - 37	5	14	13	4	36
38 - 41	1	6	9	0	16
42 - 45	0	4	10	0	14
46 - 49	2	2	4	0	8
50 - 53	1	1	0	0	2
Totals	8	76	404	109	598

NOTE: Heavy lines enclose log grade-diameter classes included in Table 9.

TABLE 23 - RECOVERY OF DRY UNTRIMMED VENEER BY 1 AND 4-INCH DIAMETER CLASSES IN SQUARE FEET (3/8-INCH) AND PERCENT
RAW DATA - OLD-GROWTH TREES

LOG GRADE 1 & 2 PEELER

Diam.	Veneer Grade A	B	C	D	Total
34	1760	1788	1773	445	5766
35	1190	130	1157	248	2725
36	1599	1081	3146	635	6461
37	0	0	0	0	0
SUB	4549	2999	6076	1328	14952
%	30.42	20.06	40.64	8.88	
38	0	0	0	0	0
39	0	0	0	0	0
40	0	0	0	0	0
41	306	673	2331	913	4223
SUB	306	673	2331	913	4223
%	7.25	15.94	55.20	21.62	
42	0	0	0	0	0
43	0	0	0	0	0
44	0	0	0	0	0
45	0	0	0	0	0
SUB	0	0	0	0	0
46	1647	1191	1497	151	4486
47	0	0	0	0	0
48	0	0	0	0	0
49	1356	938	1485	85	3864
SUB	3003	2129	2982	236	8350
%	35.96	25.50	35.71	2.83	
50	1373	1115	2860	489	5837
51	0	0	0	0	0
52	0	0	0	0	0
53	0	0	0	0	0
SUB	1373	1115	2860	489	5837
%	23.52	19.10	49.00	8.38	
TOT	9231	6916	14249	2966	33362
%	27.67	20.73	42.71	8.89	

LOG GRADE 3 PEELER

Diam.	Veneer Grade A	B	C	D	Total
22	0	0	0	0	0
23	0	0	0	0	0
24	1163	1063	4028	722	6976
25	1486	686	3290	1206	6668
SUB	2649	1749	7318	1928	13644
%	19.42	12.82	53.64	14.13	
26	1323	1517	4858	1382	9080
27	591	890	1641	370	3492
28	1221	1629	5775	1123	9748
29	1184	1353	3737	216	6490
SUB	4319	5389	16011	3091	28810
%	14.99	18.71	55.57	10.73	
30	904	783	3695	533	6015
31	977	3099	2258	1056	7390
32	1792	2996	3694	1367	9849
33	2134	2412	3487	1951	9984
SUB	5807	9390	13134	4907	33238
%	17.47	28.25	39.52	14.76	
34	2029	4074	4373	3232	13708
35	1318	2218	2685	1820	8041
36	2490	1742	3458	3939	11629
37	682	853	1536	150	3221
SUB	6519	8887	12052	9141	36599
%	17.81	24.28	32.93	24.98	
38	1291	1943	6227	2697	12158
39	820	1059	1661	183	3723
40	0	0	0	0	0
41	1030	1408	409	557	3404
SUB	3141	4410	8297	3437	19285
%	16.29	22.87	43.02	17.82	
42	0	0	0	0	0
43	1139	481	645	540	2805
44	1441	1921	2328	1562	7252
45	1244	1240	635	862	3981
SUB	3824	3642	3608	2964	14038
%	27.24	25.94	25.70	21.11	
46	0	0	0	0	0
47	0	0	0	0	0
48	3145	2774	3062	1206	10187
49	0	0	0	0	0
SUB	3145	2774	3062	1206	10187
%	30.87	27.23	30.06	11.84	
50	0	0	0	0	0
51	434	1435	3092	470	5431
52	0	0	0	0	0
53	0	0	0	0	0
SUB	434	1435	3092	470	5431
%	7.99	26.42	56.93	8.65	
TOT	29838	37676	66574	27144	161232
%	18.51	23.37	41.29	16.84	

TABLE 23 - RECOVERY OF DRY UNTRIMMED VENEER BY 1 AND 4-INCH DIAMETER CLASSES IN SQUARE FEET (3/8-INCH) AND PERCENT
RAW DATA - OLD-GROWTH TREES

LOG GRADE 2 SAWLOG

Diam.	Veneer Grade A	B	C	D	Total
10	0	0	0	0	0
11	0	0	0	0	0
12	10	20	1195	961	2186
13	0	0	847	806	1653
SUB	10	20	2042	1767	3839
%	.26	.52	53.19	46.03	
14	0	5	1826	2679	4510
15	12	205	3839	6524	10580
16	114	456	4369	5324	10263
17	109	529	4137	6282	11057
SUB	235	1195	14171	20809	36410
%	.65	3.28	38.92	57.15	
18	227	1003	6613	8791	16634
19	231	809	7008	7846	15894
20	511	1372	8158	8763	18804
21	885	2045	9581	14804	27315
SUB	1854	5229	31360	40204	78647
%	2.36	6.65	39.87	51.12	
22	977	1607	8175	11828	22587
23	2404	3555	9918	11706	27583
24	439	2399	6276	11739	20853
25	1096	3704	5934	17673	28407
SUB	4916	11265	30303	52946	99430
%	4.94	11.33	30.48	53.25	
26	374	900	2537	8247	12058
27	536	2462	3585	11612	18195
28	365	2751	5508	9902	17926
29	667	2196	2613	11479	16955
SUB	1942	7709	14243	41240	65134
%	2.98	11.84	21.87	63.32	
30	1470	3440	3938	11209	20057
31	634	777	1355	9640	12406
32	1200	3078	3964	6693	14935
33	390	1865	3066	9889	15210
SUB	3694	9160	12323	37431	62608
%	5.90	14.63	19.68	59.79	
34	1137	2027	1291	2670	7125
35	118	363	1643	5082	7206
36	521	1304	2267	3775	7867
37	1325	2722	2776	3109	9932
SUB	3101	6416	7977	14636	32130
%	9.65	19.97	24.83	45.55	
38	68	28	219	757	1072
39	911	1231	1441	3150	6733
40	1067	2526	3050	6970	13613
41	372	732	1023	2181	4308
SUB	2418	4517	5733	13058	25726
%	9.40	17.56	22.28	50.76	
42	377	1474	1372	2500	5723
43	236	735	753	814	2538
44	1948	4364	3975	6911	17198
45	2391	1519	1805	1765	7480
SUB	4952	8092	7905	11990	32939
%	15.03	24.57	24.00	36.40	
46	0	0	0	0	0
47	1177	1429	1172	3978	7756
48	0	0	0	0	0
49	887	2813	3997	2544	10241
SUB	2064	4242	5169	6522	17997
%	11.47	23.57	28.72	36.24	
TOT	25186	57845	131226	240603	454860
%	5.54	12.72	28.85	52.90	

LOG GRADE 3 SAWLOG

Diam.	Veneer Grade A	B	C	D	Total
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	43	174	217
SUB	0	0	43	174	217
%	0	0	19.82	80.18	
10	0	0	0	0	0
11	0	0	103	37	140
12	0	0	18	99	117
13	0	7	395	1898	2300
SUB	0	7	516	2034	2557
%	0	.27	20.18	79.55	
14	0	18	195	1903	2116
15	9	3	74	1299	1385
16	105	49	305	3236	3695
17	13	23	207	2000	2243
SUB	127	93	781	8438	9439
%	1.35	.99	8.27	89.40	
18	0	28	399	2560	2987
19	20	49	585	5218	5872
20	3	23	416	5079	5521
21	0	15	337	4156	4508
SUB	23	115	1737	17013	18888
%	.12	.61	9.20	90.07	
22	5	9	67	2294	2375
23	19	32	118	1897	2066
24	0	7	197	1340	1544
25	61	125	239	6130	6555
SUB	85	173	621	11661	12540
%	.68	1.38	4.95	92.99	
26	1	79	338	4374	4792
27	0	0	74	490	564
28	7	10	38	1480	1535
29	72	107	723	4976	5878
SUB	80	196	1173	11320	12769
%	.63	1.53	9.19	88.65	
30	30	65	354	1561	2010
31	10	4	388	3573	3975
32	14	10	51	285	360
33	10	6	104	1773	1893
SUB	64	85	897	7192	8238
%	.78	1.03	10.89	87.30	
34	20	439	75	1670	2204
35	0	0	0	0	0
36	0	0	0	0	0
37	79	772	819	4692	6362
SUB	99	1211	894	6362	8566
%	1.16	14.14	10.44	74.27	
TOT	478	1880	6662	64194	73214
%	.65	2.57	9.10	87.68	

TABLE 23 - RECOVERY OF DRY UNTRIMMED VENEER BY 1 AND 4-INCH DIAMETER CLASSES IN SQUARE FEET (3/8-INCH) AND PERCENT
RAW DATA - OLD-GROWTH TREES

Diam.	LOG GRADE CULL Veneer Grade A	B	C	D	Total
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	5	0	5
17	0	0	0	0	0
SUB	0	0	5	0	5
%	0	0	100.00	0	
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
SUB	0	0	0	0	0
22	0	0	0	0	0
23	0	0	0	0	0
24	0	0	0	0	0
25	0	0	0	0	0
SUB	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
SUB	0	0	0	0	0
30	0	0	0	0	0
31	0	34	99	445	578
32	0	0	0	0	0
33	0	40	66	438	544
SUB	0	74	165	883	1122
%	0	6.60	14.71	78.70	
34	0	0	0	0	0
35	10	93	465	2177	2745
36	0	0	0	0	0
37	0	0	0	0	0
SUB	10	93	465	2177	2745
%	.36	3.39	16.94	79.31	
38	0	0	0	0	0
39	0	0	183	658	841
40	0	0	0	0	0
41	0	0	0	0	0
SUB	0	0	183	658	841
%	0	0	21.76	78.24	
TOT	10	167	818	3718	4713
% 4	.21	3.54	17.36	78.89	

Diam.	ALL LOG GRADES Veneer Grade A	B	C	D	Total
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	43	174	217
SUB	0	0	43	174	217
%	0	0	19.82	80.18	
10	0	0	0	0	0
11	0	0	103	37	140
12	10	20	1213	1060	2303
13	0	7	1242	2704	3953
SUB	10	27	2558	3801	6396
%	.16	.42	39.99	59.43	
14	0	23	2021	4582	6626
15	21	208	3913	7823	11965
16	219	505	4679	8560	13963
17	122	552	4344	8282	13300
SUB	362	1288	14957	29247	45854
%	.79	2.81	32.62	63.78	
18	227	1031	7012	11351	19621
19	251	858	7593	13064	21766
20	514	1395	8574	13842	24325
21	885	2060	9918	18960	31823
SUB	1877	5344	33097	57217	97535
%	1.92	5.48	33.93	58.66	
22	982	1616	8242	14122	24962
23	2423	3587	10036	13603	29649
24	1602	3469	10501	13801	29373
25	2643	4515	9463	25009	41630
SUB	7650	13187	38242	66535	125614
%	6.09	10.50	30.44	52.97	
26	1698	2496	7733	14003	25930
27	1127	3352	5300	12472	22251
28	1593	3790	11321	12505	29209
29	1923	3656	7073	16671	29323
SUB	6341	13294	31427	55651	106713
%	5.94	12.46	29.45	52.15	
30	2404	4388	7987	13303	28082
31	1621	3914	4100	14714	24349
32	3006	6084	7709	8345	25144
33	2534	4323	6723	14051	27631
SUB	9565	18709	26519	50413	105206
%	9.09	17.78	25.21	47.92	
34	4946	8328	7512	8017	28803
35	2636	2804	5950	9327	20717
36	4610	4127	8871	8349	25957
37	2036	4347	5131	7951	19515
SUB	14278	19606	27464	33644	94992
%	15.03	20.64	28.91	35.42	
38	1359	1971	6446	3454	13230
39	1731	2290	3285	3991	11297
40	1067	2526	3050	6970	13613
41	1708	2813	3763	3651	11935
SUB	5865	9600	16544	18066	50075
%	11.71	19.17	33.04	36.08	
42	377	1474	1372	2500	5723
43	1375	1216	1398	1354	5343
44	3389	6285	6303	8473	24450
45	3635	2759	2440	2627	11461
SUB	8776	11734	11513	14954	46977
%	18.68	24.98	24.51	31.83	
46	1647	1191	1497	151	4486
47	1177	1429	1172	3978	7756
48	3145	2774	3062	1206	10187
49	2243	3751	5482	2629	14105
SUB	8212	9145	11213	7964	36534
%	22.48	25.03	30.69	21.80	
50	1373	1115	2860	489	5837
51	434	1435	3092	470	5431
52	0	0	0	0	0
53	0	0	0	0	0
SUB	1807	2550	5952	959	11268
%	16.04	22.63	52.82	8.51	
TOT	64743	104484	219529	338625	727381
%	8.90	14.36	30.18	46.55	

TABLE 24 - 1967 DOUGLAS-FIR VENEER GRADE SELLING PRICES 1/

Veneer Grade	Selling Prices-$/M Sq. Ft.
A	137.82
B	100.01
C	47.04
D	41.22

1/ Selling prices are derived from averages according to the American Plywood Association report for 1967. Prices represent plywood panel selling prices prorated to veneer grades.

TABLE 25 - NUMBER OF YOUNG-GROWTH TREES BY NUMBER OF LOGS [1/] AND DBH CLASS

DBH Class	Number of Logs						
Inches	3	4	5	6	7	8	
	Number of Trees						Total Trees
12	1						1
14	1	2					3
16	1	6	3				10
18		5	4	2			11
20	1	1	2				4
22		4	1	1			6
24			2	2			4
26				1			1
28				1	2		3
30				2			2
32					1		1
34			1			1	2
Total	4	18	13	9	3	1	48

1/ Number of logs refers to number of sawn logs 12 to 20 feet long.

TABLE 26 - LUMBER GRADE RECOVERY FROM YOUNG-GROWTH DOUGLAS-FIR TREES BY DBH CLASS IN BOARD FEET AND PERCENT

RAW DATA

	B&Btr	C	D	Mldg	3 Clr	1 Shop	2 Shop	3 Shop	Sel Str	Const	Std	Util	Econ	Total
12	0	0	0	0	0	0	0	0	55	71	8	0	0	134
%									41.0	53.0	6.0			
14	12	0	5	0	0	0	0	0	155	284	140	8	0	604
%	2.0		0.8						25.7	47.0	23.2	1.3		
16	3	4	3	27	0	0	0	7	309	1872	609	258	92	3184
%	0.1	0.1	0.1	0.8				0.2	9.7	58.9	19.1	8.1	2.9	
18	13	6	9	0	0	0	33	0	746	3634	1644	564	245	6903
%	0.2	0.1	0.1				0.5		10.8	52.7	23.9	8.2	3.5	
20	0	9	0	0	0	0	0	0	107	1322	576	167	91	2272
%		0.4							4.7	58.2	25.3	7.4	4.0	
22	2	32	0	0	0	0	0	0	861	2304	744	295	231	4469
%	0.0	0.7							19.3	51.6	16.6	6.6	5.2	
24	6	19	3	40	0	0	0	0	1296	2067	543	125	37	4136
%	0.1	0.5	0.1	1.0					31.3	50.0	13.1	3.0	0.9	
26	0	10	0	0	0	0	0	0	42	313	299	109	128	901
%		1.1							4.7	34.7	33.2	12.1	14.2	
28	0	14	9	40	0	0	33	44	241	1732	1036	1466	255	4870
%		0.3	0.2	0.8			0.7	0.9	4.9	35.6	21.3	30.1	5.2	
30	24	0	8	20	0	0	25	0	579	2087	858	240	139	3980
%	0.6		0.2	0.5			0.6		14.6	52.4	21.6	6.0	3.5	
32	0	0	0	11	0	0	0	0	123	852	554	449	112	2101
%				0.5					5.9	40.5	26.4	21.4	5.3	
34	0	0	0	48	13	0	155	51	36	1193	1267	1096	232	4091
%				1.2	0.3		3.8	1.2	0.9	29.1	31.0	26.8	5.7	
Total	60	94	37	186	13	0	246	102	4443	16409	7702	4610	1471	35373
%	0.2	0.3	0.1	0.5	0.0		0.7	0.3	12.5	46.4	21.8	13.0	4.2	

APPENDIX II

PROCEDURES USED

TO CONSTRUCT LUMBER AND VENEER GRADE

RECOVERY TABLES

PROCEDURES USED TO CONSTRUCT LUMBER AND VENEER GRADE RECOVERY TABLES

The raw data distributions of lumber and veneer recovery by log grade and diameter class tend to be erratic as a result of variations in recovery from individual logs. In order to extend the recovery data from the log sample for use in predicting recoveries from large populations of trees and logs, it is desirable to eliminate this variation inherent in the sample. This can be done by using equations to describe the relationship between recovery by lumber or veneer grade and log diameter. The problem then is to find suitable equations to describe these relationships. For this analysis, a stepwise multiple regression procedure was used to produce several sets of possible equation forms (models) relating recoveries to various transformations of diameter. The models finally selected for describing lumber recovery were chosen on the basis of statistical significance, and closeness to predicted lumber price as compared to the average price for lumber from all sample logs as well as for logs with diameters representing the major part of the volume sawn.

The general procedure followed in this analysis is outlined below as used to produce the lumber recovery tables:

1. Cards were punched showing log grade, log diameter, and total lumber tally in each lumber grade for each log in the sample.

2. Lumber tally information by lumber grade was converted to ratios to total lumber tally. Ratios were decimals accurate to four places. These ratios along with diameter and transformations of diameter were the input to a stepwise multiple regression computer program.

3. The stepwise multiple regression program was used to screen the various transformations of diameter to determine those best associated with recovery; the transformations used were the following:

X (diameter)
X^2
X^3
$\sqrt{X}$
LOGeX
$1/X$

4. Regression runs were made twice for each log grade. The first run was made to screen the above diameter transformations. The following lumber grade groups were used as dependent (Y) variables:

Y_1. Moulding and Better
Y_2. 3 Clear
Y_3. 1 Shop
Y_4. 2 Shop
Y_5. 3 Shop
Y_6. Standard & Better
Y_7. Utility
Y_8. Economy

For this first run, the program was set up to produce two sets of models. In the first case, the equations produced reflected the best fit for Moulding and Better (Y_1); in the second case, Standard and Better (Y_6) was selected to monitor the regression process. These two grade groups were used as monitors because they contain the most lumber volume.

5. As a result of the first run, several choices of regression models were available for each log grade. Those sets of equations least likely to be useful were then eliminated using the F test of significance provided by the regression output for each lumber grade.

6. The remaining models were then reanalyzed using a non-stepwise multiple regression procedure with the lumber grade groups separated to form the 13 grades (Y's) shown in Tables 4 and 5. The equations produced were then evaluated as previously described to select the final models.

7. The equations finally selected were then solved for the appropriate midpoint diameters of each diameter class in the recovery tables. Recovery ratios for each lumber grade were totaled to see if they added to 1.000. Slight differences due to rounding were adjusted by proportioning. Minus values of small magnitude at the extremes of the distributions were raised to zero, and the resulting difference was subtracted proportionately from the other lumber grades. Final recovery ratios were expressed as percentages to the nearest 0.1 percent.

For veneer the same procedures were used except that veneer grades were not grouped and only one computer regression run was necessary. The regression process was monitored on the recovery of C and D grade veneer as two cases. Lumber recoveries for young-growth trees were fitted to regression equations by the same general procedure used for old growth logs. The initial computer run, however, was made at the Pacific Southwest Forest and Range Experiment Station.

The following computer programs on file at the Forest Service Regional Office in San Francisco were used in this analysis:

1. MDC-SMR by R. L. Hurst, Utah State University.

   Performs stepwise multiple regression calculations.

2. RAFL by Robert M. Russel, Pacific Southwest Forest and Range Experiment Station.

   Performs stepwise multiple regression calculations.

3. TMJL by P. Haug and J. S. Levitan.

   Solves regression equations.

TABLE 27. - REGRESSION EQUATIONS FOR EACH LUMBER GRADE BY LOG GRADES

Moulding & Better, R/D; Shop, S/D; Dimension, S/G

Lumber Grade	Regression Coefficients a	b	c	d	F	Coef. of Determination
LOG GRADE 3 PEELER						
Model: $Y = a + b/x$						
B & Btr	0.11646	-2.61435			12.53*	0.086
C	0.16111	-2.29711			3.40	0.025
D	0.04760	1.47802			2.36	0.018
Mldg	0.56479	-10.53207			23.07*	0.149
3 Clr	0.01197	-0.22456			0.99	0.007
1 Shop	0.02481	-0.23625			0.34	0.003
2 Shop	0.07445	-0.64294			0.57	0.004
3 Shop	0.05524	-1.02723			3.33	0.025
Sel Str	-0.14056	6.43768			17.39*	0.116
Const	-0.06729	6.75799			16.16*	0.109
Std	-0.01229	2.88246			9.06*	0.064
Util	0.10351	0.37530			0.06	0.000
Econ	0.06017	-0.36019			0.13	0.001
LOG GRADE 2 SAWLOG						
Model: $Y = a + bx + cx^3 + d\sqrt{x}$						
B & Btr	0.10527	0.00717	0.000000	-0.05461	29.32*	0.088
C	0.07535	0.00789	-0.000001	-0.04828	31.19*	0.093
D	-0.14621	-0.00457	0.000000	0.05838	40.92*	0.119
Mldg	0.28994	0.02470	-0.000001	-0.16600	125.16*	0.292
3 Clr	0.12859	0.00955	-0.000001	-0.06957	35.76*	0.105
1 Shop	0.68201	0.05008	-0.000004	-0.36692	165.52*	0.353
2 Shop	0.57977	0.05608	-0.000006	-0.36025	220.68*	0.421
3 Shop	-0.14865	-0.00508	0.000000	0.06046	31.79*	0.095
Sel Str	-1.10721	-0.07748	0.000006	0.60663	17.33*	0.054
Const	1.74893	0.043930	-0.000002	-0.51047	101.27*	0.250
Std	-0.47150	-0.05488	0.000004	0.38962	31.69*	0.095
Util	-0.69334	-0.05353	0.000004	0.42611	1.70	0.006
Econ	-0.04318	-0.00388	0.000001	0.03501	5.84*	0.019

TABLE 27. - REGRESSION EQUATIONS FOR EACH LUMBER GRADE BY LOG GRADES (Continued)

Moulding & Better, R/D; Shop, S/D; Dimension, S/G

Lumber Grade	Regression Coefficients a	b	c	d	F	Coef. of Determination
			LOG GRADE 3 SAWLOG			
			Model: $Y = a + bx + cLOG_e x$			
B & Btr	0.00753	0.00029	-0.00437		2.58	0.010
C	-0.00809	-0.00021	0.00546		0.38	0.001
D	0.03850	0.00163	-0.02292		18.97*	0.067
Mldg	0.09308	0.00473	-0.06017		93.60*	0.262
3 Clr	0.02907	0.00130	-0.01801		17.13*	0.061
1 Shop	0.12199	0.00626	-0.08031		153.53*	0.369
2 Shop	0.22917	0.01586	-0.16919		293.31*	0.527
3 Shop	-0.04869	0.00200	0.01264		91.39*	0.258
Sel Str	0.09635	0.00042	-0.03043		5.98*	0.022
Const	1.86001	0.02214	-0.71974		136.04*	0.341
Std	-0.32826	-0.02497	0.37222		23.14*	0.081
Util	-0.99247	-0.02957	0.64982		45.39*	0.147
Econ	-0.09819	0.00012	0.06499		17.77*	0.063

*Significant at 5% level of probability.

TABLE 28. - REGRESSION EQUATIONS FOR EACH LUMBER GRADE BY LOG GRADES

Shop & Better, S/D; Dimension, S/G

Lumber Grade	Regression Coefficients a	b	c	F	Coef. of Determination
LOG GRADE 3 PEELER					
Model: $Y = a + b/x$					
B & Btr	0.0825	-1.6309		5.56*	0.041
C	0.2605	-4.7904		16.85*	0.115
D	0.0581	1.1813		1.68	0.013
Mldg	0.4612	-8.5305		26.83*	0.171
3 Clr	0.0122	-0.1955		0.60	0.005
1 Shop	0.0223	-0.0130		0.00	0.000
2 Shop	0.0877	-1.0070		1.31	0.10
3 Shop	0.0634	-1.2023		3.92*	0.029
Sel Str	-0.1262	5.8786		12.90*	0.090
Const	-0.0969	7.7396		17.15*	0.117
Std	-0.0175	3.3904		5.37*	0.040
Util	0.1150	-0.3773		0.07	0.001
Econ	0.0776	-0.4427		0.09	0.001
LOG GRADE 2 SAWLOG					
Model: $Y = a + bx + cLOG_e x$					
B & Btr	0.0642	0.0024	-0.0367	48.50*	0.096
C	-0.0474	0.0012	0.0128	82.65*	0.154
D	-0.1118	-0.0004	0.0475	56.58*	0.111
Mldg	0.0541	0.0060	-0.0490	172.67*	0.275
3 Clr	0.0188	0.0016	-0.0159	65.35*	0.126
1 Shop	0.0292	0.0063	-0.0459	242.79*	0.348
2 Shop	-0.5053	-0.0029	0.2066	256.79*	0.361
3 Shop	-0.1257	-0.0013	0.0571	33.66*	0.069
Sel Str	-0.1215	-0.0082	0.1239	18.49*	0.039
Const	1.3888	0.0023	-0.3694	139.09*	0.234
Std	0.2422	-0.0072	0.0383	42.97*	0.086
Util	-0.0334	-0.0051	0.1009	1.63	0.004
Econ	0.1481	0.0053	-0.0703	17.04*	0.036

*Significant at 5% level of probability.

TABLE 28. - REGRESSION EQUATIONS FOR EACH LUMBER GRADE BY LOG GRADES (Continued)

Shop & Better, S/D; Dimension, S/G

Lumber Grade	Regression Coefficients a	b	c	F	Coef. of Determination
LOG GRADE 3 SAWLOG Model: $Y = a + bx + cLOG_e x$					
B & Btr	0.00597	0.00022	-0.00334	1.50	0.006
C	-0.00036	0.00016	0.00026	1.49	0.006
D	0.02503	0.00125	-0.01559	26.19*	0.091
Mldg	0.08604	0.00362	-0.05168	31.64*	0.107
3 Clr	0.03999	0.00177	-0.02481	26.85*	0.093
1 Shop	0.19607	0.00932	-0.12584	206.69*	0.440
2 Shop	0.19603	0.01498	-0.15108	250.24*	0.488
3 Shop	-0.07237	0.00080	0.02829	68.00*	0.205
Sel Str	0.10440	0.00072	-0.03607	6.16*	0.023
Const	1.92140	0.02372	-0.75766	134.12*	0.338
Std	-0.27669	-0.02442	0.34849	22.72*	0.080
Util	-0.10451	-0.03465	0.72202	35.99*	0.120
Econ	-0.12102	0.00252	0.06699	20.42*	0.072

*Significant at 5% level of probability.

TABLE 29. - REGRESSION EQUATIONS FOR EACH VENEER GRADE BY LOG GRADES

Veneer Grade	Regression Coefficients a	b	c	d	F	Coef. of Determination
			LOG GRADE 3 PEELER			
			Model: $Y = a + b \, LOG_e x$			
A	-20.649	10.9710			2.31	0.030
B	-44.743	19.4210			6.80*	0.084
C	194.289	-43.2010			17.92*	0.195
D	-28.867	12.800			1.93	0.025
			LOG GRADE 2 SAWLOG			
			Model: $Y = a + bx^2 + cx$			
A	-2.2260	0.003840	0.15126		37.36*	0.157
B	-12.6220	-0.009060	1.16209		39.20*	0.164
C	92.1680	0.053658	-3.90453		23.11*	0.103
D	22.6846	-0.048432	2.59084		3.21*	0.016
			LOG GRADE 3 SAWLOG			
			Model: $Y = a + bx^2 + cLOG_e x + d\sqrt{x}$			
A	-22.6599	0.019775	50.7862	-30.5316	0.22	0.006
B	-41.6567	0.059498	116.7921	-74.1000	11.33*	0.244
C	216.2110	-0.063355	-284.1043	149.6243	2.87*	0.076
D	-51.8784	-0.015920	116.5008	-44.9840	3.15*	0.082

*Significant at 5% level of probability.

TABLE 30. - REGRESSION EQUATIONS FOR EACH LUMBER GRADE BY DBH CLASS - YOUNG GROWTH TREES

Lumber Grade	Regression Coefficients a	b	F	Coef. of Determination

Model: $Y = a + bx^3$

B & Btr	0.0033	-0.0000001	0.66	0.014
C	0.0021	0.0000000	0..01	0.000
D	0.0017	0.0000000	0.46	0.010
Mldg	0.0018	0.0000002	0.88	0.019
3 Clr	-0.0004	0.0000000	11.68*	0.203
1 Shop	0.0000	0.0000000	-	-
2 Shop	-0.0024	0.0000006	9.88*	0.177
3 Shop	-0.0007	0.0000002	5.98*	0.115
Sel Str	0.1725	-0.0000029	1.91	0.040
Const	0.5706	-0.0000063	9.34*	0.169
Std	0.1900	0.0000019	1.15	0.024
Util	0.0357	0.0000055	14.33*	0.237
Econ	0.0258	0.0000010	2.05	0.043

*Significant at 5 percent level of probability.